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Communicated to the Society of Antiquaries by

Reginald A. Smith, Esq., B.A., F.S.A.



Oxford

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VII.—*On the Date of Grime's Graves and Cissbury Flint-mines.*  
By REGINALD A. SMITH, Esq., B.A., F.S.A.

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Read 9th May, 1912.

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THE formal recognition by the Monaco Congress (1906) of the Aurignac stage of culture marks a distinct advance in the classification of palaeolithic cave-relics. The point has been keenly debated, but most are now agreed that Aurignac, as a typical station, comes between Le Moustier and Solutré, and represents a civilization that extended over a large part of Europe. This stage has in recent years been so thoroughly studied that its distinctive types can be easily recognized, and many cave-deposits readily fall into this division; but so far very little of this sort has been noticed in England,<sup>1</sup> where the industry seems, however, to have had a special and a splendid development.

The proposal to transfer the well-known culture of Cissbury from the neolithic to the late palaeolithic period, that is to about the middle of the Upper Pleistocene, must appear revolutionary; and a single paper can only offer a few suggestions towards the solution of several problems involved. But the cultural evidence alone is practically decisive. On consideration of several analogies to be found in the national collection, the President, as Keeper of the British and Mediaeval Department of the British Museum, was satisfied that a *prima facie* case had been made out; and it is hoped that the old difficulties connected with the period in question will be removed by further study in the light of newly ascertained facts.

A brief outline of what is necessarily a long paper may next be given, as the subject is discussed from more than one point of view. The present arrangement is due to the necessity of first recalling the main points established by excavations at Grime's Graves and Cissbury some forty years ago, and not readily accessible except in large libraries. Following a description of either site is an analysis of the finds so far as they bear on the date and culture; and the relation of what may be called the Cissbury celt and certain other types to the Drift or river-gravel deposits is illustrated by examples both in England and abroad.

<sup>1</sup> Dr. Allen Sturge's paper on Cave-periods in East Anglia is not yet published: a summary appeared in the *Antiquary*, May, 1912, p. 193.

To facilitate the recognition of these types as a local facies of the Aurignac culture, a summary of the main features of this stage in the palaeolithic cave-period is given; and the distribution of its characteristic forms is indicated both in the British Isles and distant parts of the world. Next, the geology of several sites is noticed in order to show their striking similarity and to associate their horizon with the later Loess of the Continent. Once the connexion is admitted, various arguments against a palaeolithic date may lose much of their cogency; and recent evidence with regard to the domestication of animals, polishing of stone, and baking of pottery will be adduced to show that the difficulties are not insurmountable. The subsequent evolution of the Cissbury types will be outlined with all diffidence, as the neolithic period is still exceedingly obscure, and the position of several of the best-known finds in the series has not been finally determined. Finally, a word is said in favour of the English climate, as influenced by an insular position in the track of the Gulf Stream; and doubts expressed as to the validity of ideas expressed by such terms as 'mesolithic' and 'hiatus', which appear to have been invented to disguise various gaps in our knowledge of the remote past. Though the scheme suggested may seem to shorten the neolithic period, it will be contended that the Cissbury culture, generally attributed to the later Stone Age, is of much greater antiquity; and that progress, though checked from time to time, has not been seriously interrupted since man first took to chipping tools of flint.

In 1870 our Fellow Canon Greenwell excavated one of 254 saucer-shaped depressions known collectively as Grime's Graves<sup>1</sup> in the parish of Weeting, Norfolk, 3 miles north-east of Brandon; and found in the chalk rock a mine which reached a depth of 39 ft. from the surface, and had evidently been opened for the purpose of working a particularly good layer of flint occurring at that depth. The pit was circular, with a diameter of 28 ft. at the mouth, tapering to 12 ft. at the bottom, which was flat and gave access to a number of galleries radiating on the same level. A feature on which the Canon remarked with some perplexity was a layer of dark yellow sand 13 ft. thick above the chalk rock, interspersed with coarse nodules of flint similar to those on the surface of the chalk. The significance of this will be discussed later (p. 144); and though it is doubtful whether the ancient miners ever pierced this stratum, it is clear that they were undaunted by the chalk, as a seam of inferior flint (the 'wall-stone' of the modern flint-workers) was passed at 19½ ft. from the top of the chalk. No diagram of the vertical section has been published, but the lowest 18 ft. consisted of pure chalk taken from between the beds of flint, and next in order came the thick bed of sand, surmounted by various layers perhaps derived from other pits.

<sup>1</sup> *Journal of Ethnological Society of London*, N.S. ii. (1870), p. 419.

Many of the specimens in the British Museum and certain private collections from Grime's Graves were collected from the surface in the immediate neighbourhood of the reopened pit,<sup>1</sup> but some were found in the filling, and comprised implements of flint, deer-antler, and bone, and a remarkable polished celt of basalt (fig. 16) with almost circular section and pointed butt, found in one of the mine-galleries. The authenticity of this find has recently been called in question; but the evidence of the excavator, confirmed by Dr. Allen Sturge, who made careful inquiries in the neighbourhood, should dispel all doubts. Marks on the gallery-wall were recognized by the Canon as made in mining with this tool, and he may be said to have prophesied its discovery.<sup>2</sup> The usual tools were, however, picks and wedges ingeniously made out of red-deer antlers,<sup>3</sup> which were trimmed by fire and hacking with flint; and it was noticed that the 79 picks were all found below 17 ft. from the surface. The antlers were of large size, and all but eleven had been shed.

Animal bones, all found between 4 ft. and 28 ft. from the surface and not in the galleries, had been broken for the marrow, and nearly all were of young calves, probably of the species *Bos longifrons*; but the goat or sheep, the horse, pig, and dog were also represented. This group has always been described as domesticated, but it will be seen in the sequel that there are grounds for modifying this description, in spite of the widespread superstition that animals were not tamed till neolithic times.

It is specially noted that no pottery was found in the pit; and a layer of charcoal, no doubt the remains of a hearth 4 ft. wide and 5 ft. long, was encountered at a depth of 28 ft. Fourteen hammer-stones made of quartzite pebbles derived from the Boulder-clay were no doubt used in flaking the flint, of which material some interesting specimens were recovered. Neither in the pit nor in its vicinity was any trace of polishing (grinding) observed on flint.

One of the implements found near Grime's Graves, and published by Canon Greenwell in his paper on the flint-mine opened by himself, was significantly discussed by Sir John Evans.<sup>4</sup> It resembled the latter's fig. 17 from the Downs near Dunstable, and approached very closely to ovate implements from the river-gravels; but 'from the manner in which it is fashioned and from its being found in company with worked flints unquestionably belonging to the surface-period', he regarded it as neolithic. In a foot-note this judgement is practically reversed, as 'the discoveries of Mr. Worthington Smith at Caddington suggest the possibility of this (Dunstable) specimen being, after all, palaeolithic'. Other

<sup>1</sup> *Op. cit.*, pl. xxviii; pl. xxx gives the specimens found in the excavation.

<sup>2</sup> *Man*, 1908, no. 92; and see p. 147 below.

<sup>3</sup> The subject was fully discussed by Mr. Horace Sandars, F.S.A., in *Archaeologia*, lxii. 101.

<sup>4</sup> *Journ. Ethnol. Soc.*, N.S. ii, pl. xxviii, fig. 7; Evans, *Stone Implements*, 2nd ed., p. 72.

examples were found at Cissbury, also in Hants and Yorks., and larger specimens of the same type have been obtained from the ancient flint-factories of Belgium (Evans collection).

The flint implements recovered from the pit at Grime's Graves and the immediate neighbourhood fall into two classes as regards patination: while the roughly-shaped lumps have a dull white surface with sharp edges and ridges, the better implements are generally of bluish-grey colour, often with spots of iron-staining on the ridges, the surface lusted to a large extent, and almost chalcedonic. The surface of the latter group is not appreciably decayed, and in spite of its exceptional hardness has no sharp edges or angles, but is often striated in such a manner as to suggest ice action. The majority of specimens collected from the site by Canon Greenwell were presented to the British Museum, most of the illustrations being from that collection; but a good series acquired at the same date has passed into the hands of Dr. Allen Sturge, and other collectors possess specimens from the surface, but not so intimately associated with the pit. The following list gives the salient points of selected specimens, and parallels from other sites where such are relevant to the present inquiry:

- Fig. 1. Ovate hand-axe, fairly thin, both faces with primary flaking, and the edges curved as indicated by the dotted line, as usual a reverse S-curve. Except for its lustrous bluish surface, this might be taken for a St. Acheul type from the river-gravels, somewhat late in the middle Pleistocene; and there can be little doubt that it is a degenerate hand-axe.
- Fig. 2. A large white lump better shaped than many, and having (as often) a thick back for the hand, and a zigzag cutting edge made by alternate flaking. The edge and workmanship are reminiscent of the Chelles period, but the style of flaking was no doubt dictated by the use to which the implement was to be put; and the present specimen represents a number of chopping-tools, somewhat more roughly made than at Cissbury (fig. 25). The same type, somewhat longer, is found at Le Moustier.
- Fig. 3. A boldly-flaked tool of segmental plan, with a broad flat base and all the work on one face. The curved edge is nearly all sharp, and the tool seems to have been intended for chopping. A patch of crust on the base should be noticed as proof that the implement has not been accidentally broken across, but is, like many others of the type, complete.
- Fig. 4. A specimen apparently related to the last, but with certain features that are exactly duplicated on another from the site. The plan is a segment of a circle, the faces nearly flat, one flaked, the other a plain fracture with a large bulb of percussion which interrupts the cutting-edge.
- Fig. 5. A type common both on this site and at Cissbury, and often regarded as one end of a celt that has been accidentally broken across. This is evidently erroneous, as the base frequently bears the original crust of the nodule, or is furnished with a

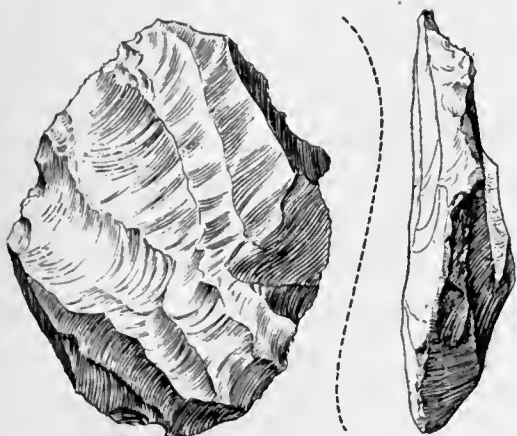


Fig. 1. Implement of Drift type, with side view and curve of edge; Grime's Graves.  $\frac{1}{2}$ .



Fig. 2. Flint chopper, with side view, showing zigzag cutting-edge; Grime's Graves.  $\frac{1}{2}$ .

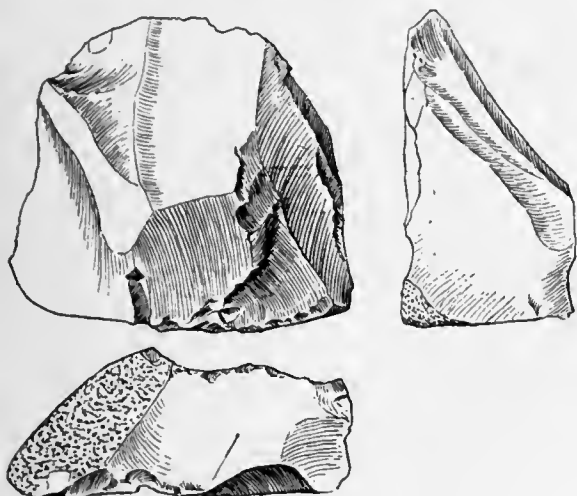


Fig. 3. Segmental tool flaked on one face, with views of side and base; Grime's Graves.  $\frac{1}{2}$ .

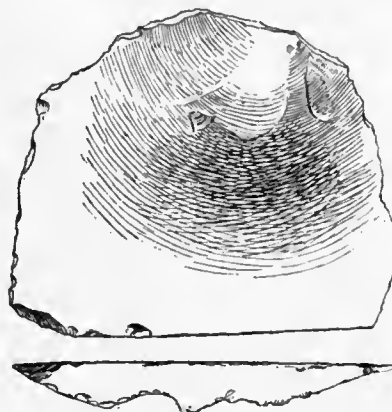
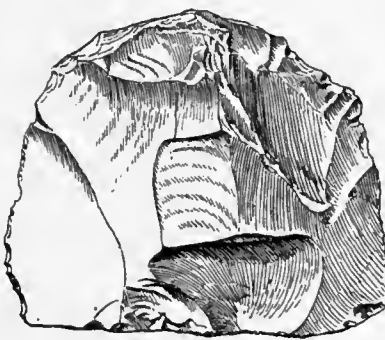


Fig. 4. Segmental tool, blunt at top, with views of back and base; Grime's Graves.  $\frac{1}{2}$ .



Fig. 5. Flint tool flaked on both faces, with section; Weeting.  $\frac{1}{2}$ .



Fig. 6. Celt of Cissbury type, with section; near Grime's Graves.  $\frac{1}{4}$ .

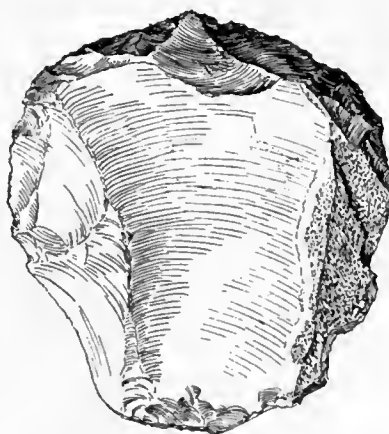


Fig. 7. Steep-edged scraper, with side view; Grime's Graves.  $\frac{1}{2}$ .

- hinge-fracture to accommodate it to the hand. As usual it is flaked on both faces, which have about the same convexity, and the sides are approximately parallel.
- Fig. 6. An exceptional piece from this site both in form and colour. The surface is much altered and is milk-white all over, the section almost of lozenge form, the edges parallel, and both ends curved and sharpened. It is a celt in the ordinary sense, and serves to connect Grime's Graves with Cissbury, where the type is very common and of finer workmanship. It has a few spots of iron-staining on the ridges, and was not found in the pit but in the vicinity on the surface. A companion piece is in Dr. Sturge's collection from Grime's Graves.
- Fig. 7. A scraper of exceptional form and dimensions for this site. The lower face is a plain fracture with a large bulb of percussion opposite the scraping edge, and the other face is boldly flaked, with crust at one side. The working-edge is very steep, and the surface is white, with the core showing as blue in places. Round-scrappers on both sites have more than once been described as rare, but this and the following are much larger than usual, and recall the imposing productions of the early Le Moustier stage, as represented at Northfleet, Kent (Mr. G. J. B. Fox).
- Fig. 8. A round-scraper not so boldly fashioned as the last, but otherwise similar. The steep working-edge is shown on the right, and the side view also gives the large bulb of percussion on the plain lower face. This and the foregoing are obviously related to a white specimen illustrated by Mr. W. G. Smith<sup>1</sup> and found by him 16 ft. deep at Caddington, near Luton, evidently on the upper palaeolithic floor below contorted Drift.
- Fig. 9. Small white scraper with steep working-edge and flat faces, tapering below to form a tang or handle. The Aurignac fluting is noticeable here, and another, practically identical, has been found at Seaford, Sussex.
- Fig. 10. A typical 'nucleiform scraper', known as the *grattoir Tarté* (being particularly common at Tarté, a cave of the Aurignac period in Haute-Garonne). Its use as a plane is however doubtful, in view of the uneven base of several; and till its true function is determined, it may be called a 'flint-cone'. Apart from other evidence there might well be hesitation in accepting the identity of specimens on sites so far removed; but many coincidences will be noticed in the following pages, and no apology is necessary for assigning English specimens to the Aurignac stage, that being the horizon indicated by many cave-finds in the south of France. Another specimen still more symmetrical is illustrated (fig. 33) from Mr. T. H. Powell's collection, from the Sussex downs at Seaford, and it is now found that the type is common in the south of England. For instance, one in the Blackmore museum from Whitsbury, six miles south of Salisbury, 0.9 in. high, suggested further search; and Dr. Blackmore states in a letter that six or seven are stored in the museum from the Donhead district, on the Wiltshire border, three miles north-east of Shaftesbury.
- Fig. 11. A peculiar but typical specimen, which may be termed a humped scraper or plane. Roughly of segmental form, it differs from another type with the same outline in

<sup>1</sup> *Man, the Primeval Savage*, p. 112, fig. 73.



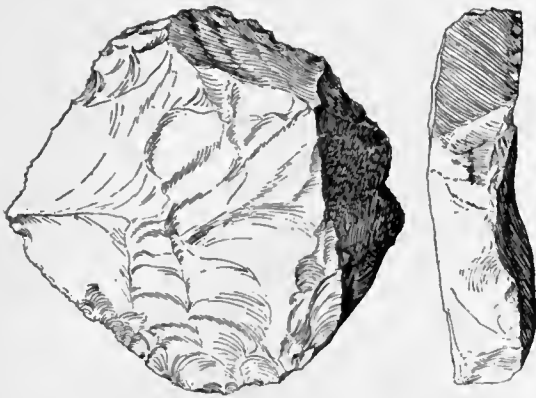


Fig. 8. Steep-edged scraper, with side view; Grime's Graves.  $\frac{1}{2}$ .

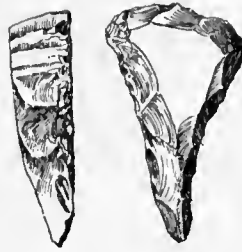


Fig. 9. Tanged scraper, side and top views; near Grime's Graves.  $\frac{1}{2}$ .

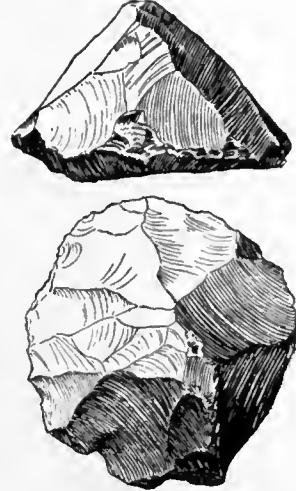


Fig. 10. Flint cone, side and top views; Grime's Graves.  $\frac{1}{2}$ .

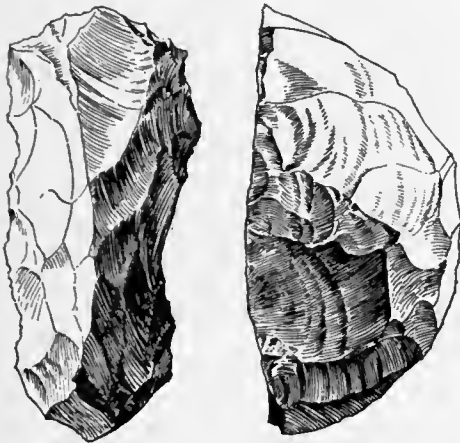


Fig. 11. Carinated scraper, with side view; Grime's Graves.  $\frac{1}{2}$ .

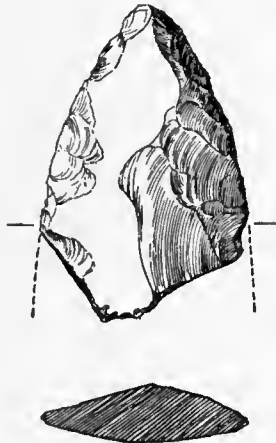


Fig. 12. Part of leaf-shaped blade, with section; Weeting.  $\frac{1}{2}$ .

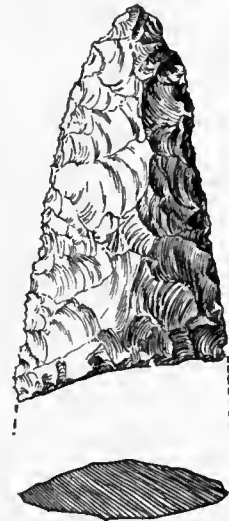


Fig. 13. Part of leaf-shaped blade with section; near Grime's Graves.  $\frac{1}{2}$ .



Fig. 14. Bone piercer; Grime's Graves.  $\frac{1}{2}$ .



Fig. 15. Bone tool, top and side views; Grime's Graves.  $\frac{1}{2}$ .

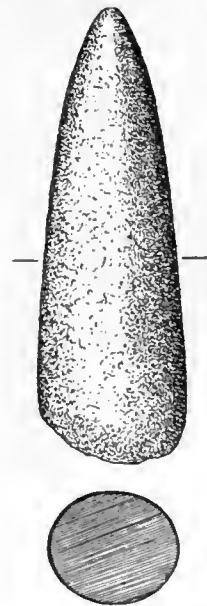


Fig. 16. Basalt celt, with section; Grime's Graves.  $\frac{1}{3}$ .

having the working-edge at one end, not on the periphery. The top view shows a slight compression in the middle of the side, which is no doubt intentional and makes the resemblance to certain planes of the Aurignac period all the more striking. The parallel chosen for illustration (fig. 36) is in the British Museum with another specimen much smaller, and both were found by Messrs. Lartet and Christy at Les Eyzies, a cave-deposit generally assigned to the transition from Solutré to La Madeleine. There was certainly much of that date discovered; but many planes with steep fluting, not to mention a tanged point referable to the Font Robert<sup>1</sup> or latest phase of the Aurignac culture, prove that an earlier deposit was also excavated. The evidence for this contention is ample, and other forms that are reproduced at Cissbury or Grime's Graves may therefore be assigned with little hesitation to the Aurignac stage. The Grime's Graves example is bluish grey with hard lustred surface, exactly corresponding to that of fig. 10.

Fig. 12. Once the Aurignac date is accepted, this example will be readily seen to represent the beginnings of the early Solutré style, thin leaf-shaped blades flaked all over both faces characterizing Solutré I. Further proof is afforded by Cissbury (pl. xxiii), and it will be observed that on practically every specimen from our two sites a certain part of the face is left without surface-flaking, which normally covers both faces at Solutré. This and the next specimen are accidentally broken, and many typical specimens from France show that this was a common misfortune in Solutré times. The broken lines show the continuation of the two sharp edges, but the exact outline and dimensions cannot be determined from the surviving portion, which is more finely flaked on the other and flatter face. The colour is pearl-grey with slight iron-staining; and the surface has minute striae as if sand had been passed over it under pressure. These markings have been repeatedly noticed by Dr. Sturge on a certain class of flints scattered over an area at Icklingham.<sup>2</sup>

Fig. 13. Part of a leaf-shaped blade carefully flaked all over both faces, but thicker than the typical Solutré blade, though fragments as thick and otherwise identical are in the British Museum from Laugerie Haute, a typical Solutré site. It is of a dark dove-colour and more lustred or chalcedonic than the last, and, moreover, has striae of a different character. The hard surface has been roughly scored by points of other hard stones acting under great pressure; and in this connexion it should be added that the iron-staining is slight.

Fig. 14. A bone piercer rubbed smooth except at the butt, and tapering to a point, found at a depth of 17 ft. The simplicity of the tool prevents any exact correlation with cave specimens, but may be due to the fact that, according to present evidence, bone was hardly worked at the date of Le Moustier. In Aurignac times the industry was largely developed and wonderful carvings in the round were produced; nor is it impossible that the polishing of bone suggested the same treatment of flint.

<sup>1</sup> *Stone Age Guide* (Brit. Mus.), 2nd ed., p. 50.

<sup>2</sup> *Proc. Preh. Soc. E. Anglia*, i. 80, 91; *Proceedings*, xxiii. 240.

- Fig. 15. Two views of a bone rod, slightly curved, and polished all over. It has been considered a smoothing tool, but its form is elementary, and the determination of its exact use is not essential. It was found at a depth of 35 ft.
- Fig. 16. A polished celt of basalt or greenstone, which more than any other specimen has influenced the verdict on Grime's Graves and Cissbury. Palaeolithic forms might be recognized again and again, but a polished celt barred the way to a palaeolithic date. It was found in one of the galleries on the floor of Canon Greenwell's pit (p. 147), and cannot well have been a later introduction, though recently doubts have been cast on the *bona fides* of the workmen. Canon Greenwell's testimony is explicit, and Dr. Sturge's inquiries have only confirmed the authenticity of the celt. Further excavation of the pits would no doubt set the matter at rest, but at present it must be regarded as unique among the finds on both sites; and the most plausible argument against their palaeolithic date must be met. Recent investigations in Norway (p. 148) have shown that axes of the same material but of rougher form, some merely chipped and others partially ground into shape, were produced at least as early as the kitchen-middens of Denmark. Whereas stones of this character are best ground into shape, flint can be easily chipped, but polished only with difficulty.

The butt is pointed and the section nearly a circle at the centre: the cutting edge is, as usual after being used, unsymmetrical, a small fracture at the angle having left traces in the wall-markings made with this implement in excavating the chalk. Celts of this material are common on the eastern edge of the Fens and abundant in Yorkshire. A fragment much weathered has been found on the slopes of Cissbury, and a roughly shaped lump as well as a polished celt came from Torbryan Cave, near Denbury, Devon.<sup>1</sup>

A few Weeting specimens, among those collected by Canon Greenwell from the vicinity of Grime's Graves, may be mentioned here, though there is little to prove that they are of the same date as the pits. The abundance of typical specimens in the neighbourhood of the Cissbury pits, however, suggests that the surface finds are largely contemporary, and there is some internal evidence to the same effect. Perhaps the most attractive example is a small leaf-shaped blade flaked all over one face exactly in the Solutré manner. This face is fresh-looking and almost black, but there is a large patch of gloss (as on many Savernake palaeoliths) in the centre, that indicates great antiquity. The other face is a plain fracture with bulb at the end, and is bluish white, the patina being pronounced and lustrous. The two faces were evidently produced at different periods, separated by a considerable interval, but whether the later work dates from Solutré or neolithic times is at present an open question. A curious specimen in black flint, resembling a barbed lance-head, 3.1 in. long, might well be suspected of being later than the pit, if there was not a larger example extant

<sup>1</sup> *Stone Age Guide*, 2nd ed., p. 73.

from Cissbury (now in Dr. Sturge's collection). What seems to be a third example,  $6\frac{1}{4}$  in. long, was found in Dépt. Eure with a flint tool that has the appearance of a blunt-nosed plane, but with much of the crust remaining and a constriction or waist near the centre (as fig. 39).<sup>1</sup> The coincidence is striking, but parallels from any site otherwise dated have yet to be found.

The significance of artistic carving at Grime's Graves could not be appreciated till Piette proved a succession of phases in palaeolithic art. It is now generally accepted that carving in the round dates from the Aurignac stage, and was followed first by carving in relief and subsequently by engraving.<sup>2</sup> Neolithic man has so far given no evidence of artistic capacity at all comparable to that of the palaeolithic troglodytes; and now that other arguments are available, there can be little hesitation in assigning to the Aurignac stage a *glans penis* carved in chalk, measuring 1 in. each way, and found in the pit at Grime's Graves at a depth of 31 ft., not far from chalk fragments that have been taken to represent part of a human fore-arm and finger. It is possible that these belonged to a life-size statue, and something of the same sort was found at Cissbury (p. 124). Representations of the human form (especially women) on a much smaller scale are remarkably common at this period, the material employed being generally mammoth ivory.<sup>3</sup> The exaggeration of the sexual characteristics in these statuettes has been constantly remarked upon, and a close parallel in reindeer-antler, suggesting the complete form of the Grime's Graves specimen, has been published from Gorge d'Enfer, Dordogne, one of the best-known stations of Aurignac date.<sup>4</sup>

Other objects in chalk are hollowed lumps that have been very reasonably taken for lamps, for use in the galleries of the mine, as again at Cissbury (p. 121). The cave-dwellers of the Dordogne adopted a similar method of lighting, and prehistoric examples have been recently brought together by Dr. Baudon.<sup>5</sup>

In 1868 Col. A. H. Lane-Fox (afterwards Gen. Pitt-Rivers) read to this Society an account of his excavations at Cissbury,<sup>6</sup> which hardly reached the high standard set by himself. In fact, the exploration was only superficial, and failed to disclose the nature of the pits. There were surface indications of about

<sup>1</sup> Both are figured by M. Léon Coutil in *Bull. Soc. préh. de France*, 22 Dec. 1910.

<sup>2</sup> *Stone Age Guide* (Brit. Mus.), 2nd ed., p. 61.

<sup>3</sup> Piette, *L'art pendant l'âge du renne*; *L'Anthropologie*, 1895, p. 129; R. R. Schmidt, *Zeitschrift für Ethnologie*, 1911, p. 968.

<sup>4</sup> Girod and Massénat, *Les stations de l'âge du Renne*, pl. i, fig. 3, where the locality is given as Laugerie Basse. An engraving of the corresponding organ has been found at the Blanchard rock-shelter, Sergeac, Dordogne.

<sup>5</sup> *Bull. Soc. d'études hist. et scient. de l'Oise*, vii (1911).

<sup>6</sup> *Archaeologia*, xlii. 59, pl. viii.

fifty of these on the western slope of the hill within the rampart of the earth-work. The smallest were barely noticeable, and the largest were about 70 ft. in diameter and 12 ft. deep; but the chalk filling was mistaken for the true floor of the pits, and the conclusions drawn were considerably modified on a later occasion. The plate, however, gives an excellent representation of a number of flint implements which were found during the work and subsequently presented to the Christy Collection now at the British Museum (all except his figs. 20 and 22).

Thirty of these depressions on the chalk down were opened in 1867-8, and perhaps the most important item was part of a polished flint celt (the butt end, fig. 15 on his plate), which was lying only 1 ft. from the surface. This is expressly said to have been the only polished specimen found in a total of about 600 flints.<sup>1</sup> The discovery led to some interesting speculations as to the validity of the distinction as a test of age; and it is only fair to say that the General recognized many resemblances to palaeolithic implements of Drift and Le Moustier types. He further remarked that round-scrapers (sometimes called 'thumb-scrapers', fig. 2 on his plate) were extremely rare from Cissbury, and that one face of a thin crescent-shaped blade (his fig. 20) was much glazed. This feature has since been observed on many specimens, and is particularly noticeable in palaeoliths from Knowle Farm Quarry, Savernake Forest.<sup>2</sup>

It did not escape his notice that one of his groups (figs. 10, 11 on his plate) 'closely resembling, if not facsimiles of, some of the implements found in the Drift, passed by imperceptible gradations into the celt type', broad and sharp at one end and pointed at the other (his figs. 17 and 18); and he conjectured that the hump or ridge observed on certain examples of this form was intended as a stop, to prevent the axe-head from splitting the handle (his fig. 17, and fig. 26 below). Special attention was drawn to the absence of arrow-heads or anything approaching that form of flint.

The fauna was returned as follows: *Cervus elaphus* (red-deer), *Bos longifrons* (Celtic short-horn), *Capra hircus* (goat), *Equus* (species of horse), and *Sus scrofa* (boar); no trace of *Cervus dama* (fallow-deer). The shells were *Littorina littorea* (periwinkle), *Cyclostoma elegans* (*Pomatias reflexus*), *Tapes decussatus*, and *Helix nemoralis*. But the value of the list is rather discounted by the shallowness of the pits as excavated.

Greater success attended the effort of Mr. Ernest Willett to unravel the

<sup>1</sup> Lord Northesk, who excavated here with Canon Greenwell, found another example (Evans, *Stone Implements*, 2nd ed., p. 80); and Prof. Boyd Dawkins mentions a possible third (*Journ. Anthropol. Inst.*, xxiii. 249).

<sup>2</sup> *Proceedings*, xxiii. 457.

mystery of the pits in 1873-4.<sup>1</sup> Fired by Canon Greenwell's example in Norfolk, he tested one of the pits opened five years before, and found that the bottom was not solid rock but large blocks of chalk filled in with rubble, the true bottom being in this case 14 ft. below the surface.

Prof. Boyd Dawkins was also present at the opening of an untouched pit<sup>2</sup> on a subsequent occasion, the site being indicated by a depression of about 16 in. from the hill-slope. The solid chalk edge of the pit was reached at 5 ft. from the surface, and the following table shows the material passed through before the bottom was reached at a depth of 20 ft.:

|  | FEET |
|--|------|
| Surface soil . . . . .   | 2    |
| Chalk rubble, yellowish loam and charcoal, extending beyond mouth of shaft . . . . . | 3    |
| Red earth, moist, and full of flints both worked and unworked . . . . .              | 5    |
| Chalk blocks, interstices not filled . . . . .                                       | 3    |
| Red earth, thickest in centre . . . . .  | 3    |
| Chalk blocks, interstices filled with rubble and loam . . . . .                      | 4    |

Scattered through the bottom layer were implements of red-deer antler (including a pick like those from Grime's Graves), *scapulae* of *Bos longifrons*, and one of the common pig, a few flint implements and broken flints. On the floor-level was a band of exceedingly fine flint, and a layer of inferior quality was noticed above, at a depth of 10 ft.

Mr. Willett classified about ninety worked flints from his pit as follows: 45 rough cores, 12 hatchets, 7 scrapers, 5 hammers, 12 wedges, and 12 used flakes. The hammers and wedges were found in close proximity, and appear to have been used for detaching lumps of chalk. In the first few feet from the surface the flints were patinated to a depth varying from the thickness of paper to one-eighth of an inch. Those in the red earth were only just discoloured, though coated with carbonate of lime; while the few found at 18 ft. below were nearly as fresh as the day they were made. Patination seems in this case to vary with the proximity to the surface, the upper face of the flint being more affected than the lower.

In January, 1874, Mr. Plumpton Tindale, F.S.A., opened another pit in the vicinity, but his death prevented a report by himself on the interesting discoveries that resulted. These were described to the Society from memory by Mr. Willett, and included both human and animal remains.

For the first 15 ft. practically nothing was found in the chalk rubble, but below that level were broken antlers and single tines of the red-deer. At about

<sup>1</sup> *Archaeologia*, xlv. 337 (read in 1875); details on pl. xxvi, and comparison of ground plan with Grime's Graves on pl. xxvii.

<sup>2</sup> These pits are located on the plan given in *Journ. Anthropol. Inst.*, vii, pl. x.



28 ft. two remarkably fine and perfect skulls of *Bos urus* (*primigenius*) were encountered, and in the rubble below, many bones of that animal, with others of the stag, otter, wild boar, and roe-deer; and it was observed that the antlers were mostly of slain deer. Flint implements occurred all through the deposit below the 15 ft. level, and one antler tool was pierced for the insertion of a stone. Four large pear-shaped lumps of chalk, about  $3\frac{1}{2}$  lb. each, were found pierced at the smaller end, also a lamp of the same material (fig. 17).

Mr. Willett remarked that the bones found in Mr. Tindale's pit were nearly all those of feral animals,<sup>1</sup> in contradistinction to those from Grime's Graves, which had been described as domesticated. His argument from the absence of pottery was nullified by subsequent discoveries, but he emphasized the likeness of several flints to Drift implements, and concluded that Cissbury mines were earlier in the neolithic period than Grime's Graves. It should be added that no galleries radiated from Mr. Tindale's pit, which was 39 ft. deep, oval and funnel-shaped, with a base diameter of 5 or 6 ft.<sup>2</sup>

The animal remains from this pit were discussed in 1875 by Prof. Rolleston, who dwelt specially on the large proportions of *Bos primigenius* and the significance of its appearance with *Sus scrofa ferus* in what purported to be neolithic surroundings. On Prof. Boyd Dawkins's authority he subsequently added the *Bos longifrons*, goat, and dog.<sup>3</sup>

Partly in consequence of Mr. Willett's paper on the subject, the Anthropological Institute appointed a committee in 1875 to continue excavation on the site, the work being mainly in the hands of Gen. Pitt-Rivers and Mr. Park Harrison. The former, who was then president of the Institute, prepared a report,<sup>4</sup> in which he repeated his conviction that some of the implements were distinctly allied to palaeolithic forms.<sup>5</sup> Some at least of the pits were proved earlier than the Camp, and it was noticed that the chalk here reached the surface, there being no eocene clay overlying it. That there was clay of some sort at the surface is, however, stated in a subsequent passage, where a distinction was drawn between the red seam of the filling and that of the silting. This was



Fig. 17. Chalk lamp, Cissbury flint-mine.  $\frac{1}{2}$ .

<sup>1</sup> *Journ. Anthropol. Inst.*, v. 364, 390, gives however the following list from this pit: *Bos primigenius* (large), roe, stag, wild boar, badger, *Bos longifrons*, goat, and dog. Prof. Rolleston's observations are in vol. vi. 21.

<sup>2</sup> *Ibid.*, vi. 268.

<sup>4</sup> *Ibid.*, v. 357, plates xiv-xix.

<sup>3</sup> *Ibid.*, v. 390; vi. 24.

<sup>5</sup> In this he was supported by Prof. Prestwich, who on the whole evidence, however, decided in favour of a neolithic date (*op. cit.*, p. 386).

pointed out by Prof. Prestwich, the former consisting of nearly unaltered clay 'as it is now seen upon the surface of the hill', and the latter being a mixture of clay and chalk in minute particles, as mixed by the action of rain-water. A letter from the Professor is appended to the report, and deals with this point as follows :

The débris with which the shafts were filled had evidently been freshly removed, and at once used at the time of filling, as the blocks of chalk, had they been exposed to the air for even one winter, would have crumbled and fallen to pieces, and the small quantity of stiff red clay would have lost its pure colour and tenacious character. There seems to have been a little, but not much, weathering of the sides of the shafts before the filling up took place.

In view of the hard layers<sup>1</sup> here and elsewhere it is interesting to note that the rubble from Mr. Willett's shaft had weathered into a solid mass after being exposed on the surface for one year. The reporter advised caution in accepting as authentic the markings noticed at the entrance of two galleries, though he himself had seen some uncovered; and added significantly that several fragments of chalk appeared to have been scratched by animals.

The whole network of galleries was driven along the same vein of flint, which rises with the chalk towards the north at an angle of 5°. Large quantities of broken flint nodules were found in the rubble, all too small or irregular for the making of a good implement, and all without exception of the 'unaltered blue' colour of the flint; but a few flakes were white like the surface finds. These flakes were supposed to have been exposed on the ground a long time before being thrown into the shafts along with newly excavated nodules, and the conclusion drawn was that these particular shafts were not the earliest on the site.

The shafts when dug were 17 ft. from the surface, and contained very few animal remains; pieces of antler could not be regarded as picks, and one piece of pottery, found in the clay above a shaft, was considered of later date. But in a large pit 66 ft. in diameter pottery was found at 13 ft. and 18 ft. from the surface below a red seam, one of the original vessels having been 9 in. in diameter at the mouth and 13 in. in diameter 2 in. below it. Both were coarser ware than that found at a higher level or in the ditch. In the red seam were found most of the animal remains, chipped implements and flakes, all sealed in by an original filling of chalk blocks; but rude implements occurred all through the filling. At 30 ft. was found charcoal, from furze, willow, and beech; and at the same level a chalk lamp with antler tools, one wedge being ground smooth all round. Another object of chalk was a disc 2-2½ in. across and about ¾ in. thick, with a central hole bored from both sides: this was found in the rampart, but another

<sup>1</sup> *Op. cit.*, pp. 365, 386.

occurred at Grime's Graves, 18 ft. from the surface; and there are others from Cissbury, as well as one from Dorset, in the British Museum.

The General amplified his excavation with experiments, and tested the efficacy of deer-antler tools and shoulder-blades of the ox as shovels, deciding against the latter in favour of the hands.

Prof. Rolleston's remarks on the animal remains discovered were as copious and systematic as usual, and were published with five views of the female skull.<sup>1</sup> From the 'large pit' he identified *Bos longifrons*, *Sus scrofa domesticus*, *Cervus elaphus*, *Cervus capreolus*, and *Capra hircus*, a skull of the last coming from the red seam, 9½ ft. from the surface. Bones of the roe, domestic ox, and goat were also found below the red seam. The presence of the pig and absence of the wild boar and *Bos primigenius* from the large pit induced him to date that and the skeleton pit a little later than Mr. Tindale's pit. The horse-bones were labelled 'superficial', as were all the remains of that animal at Cissbury.

The 'skeleton-shaft' proved incidentally that the pits were earlier than the ditch and rampart of the earthwork, and yielded, besides a woman's skeleton, a large number of animal bones and shells. About six pigs were represented in this shaft, the marrow-bones being mostly broken: the majority of the remainder showed ancient fractures, and the lower jaws were invariably broken. There were also traces of the goat, roe-deer, and *Bos primigenius*, but none of the red-deer or domestic ox; while the shells were *Helix nemoralis*, *arbustorum*, *lapicida*, and *rotundata*, *Zonites cellarius*, and *Cyclostoma elegans*, all found in great abundance, and below the red seam. The shells of the Cyclostomata generally had their opercula still connected.

The skeleton of a woman about twenty-five years of age was found in a vertical position head downwards, practically complete but mixed up with pig bones. It was surmised that she had fallen into the shaft and had not been properly buried. The stature was 4 ft. 9 in.; the shoulders and hips narrow and the head large and low-lying, the cubic capacity being 105 in. (1732·7 cubic centimetres), and cephalic index about 75. The skull was 2½ ft. from the floor of the shaft, which was unusually small (4½ ft. in diameter) and about 20 ft. deep, from the original surface.<sup>2</sup>

Being unsupported in that respect by his colleague, Mr. Park Harrison submitted a paper on the marks found upon chalk at Cissbury to the Anthropological Institute.<sup>3</sup> He described these markings as being on the jambs of entrances into galleries in three Cissbury shafts, and dwelt on their ancient

<sup>1</sup> *Journ. Anthropol. Inst.*, vi. 22.

<sup>2</sup> Plan and section in *op. cit.*, pl. xv, p. 376.

<sup>3</sup> *Journal*, vi. 263; see further, p. 430.

appearance, in contrast to the date 1875 cut by a visitor since one of the pits was cleared. Mr. Tindale's pit also yielded a number of rounded chalk blocks pitted with small round holes and scored with lines. On one piece the lines crossed one another or radiated from small pits; and experiments with a dog and badger failed to produce anything similar.

In October, 1876, our Director joined Mr. Park Harrison in opening another pit (called the Cave-pit), adjoining Mr. Willett's excavation of 1874. At the top was a filling of chalk rubble with large blocks; next came a layer of red clay, sloping downwards from the eastern lip of the pit and containing an abundance of flakes and implements; and below, the usual filling of angular chalk. Several chalk-blocks with markings<sup>1</sup> were discovered, but none below a level of 15 or 16 ft. In the white seam were noticed two pieces of deer's antler and a considerable quantity of charcoal between 12 and 16 ft. from the surface. Lord (then Captain) Dillon was present when the first gallery was opened, and noticed several lines scored over the entrance; and over the entrance to another gallery was also a set of marks. A piece of stag's horn, 10 in. long, bore marks of fire and was supposed to have been used to stir the fire, but similar finds at Grime's Graves suggest that fire was used on antler instead of a saw. A piece of hard stone,  $5\frac{3}{4}$  in. by  $2\frac{1}{4}$  in., of a quartzite nature, was compared with a piece from Mr. Willett's pit.

Of the twenty-five implements found, one-third had one end sharply pointed and the other unworked. No sling-stones or potsherds were noticed, and the only shells were of *Helix nemoralis*, which occurred 4 or 5 ft. from the surface: bones, worked or unworked, were extremely scarce.

The concluding stages of this excavation were described by Mr. Park Harrison in a further paper,<sup>2</sup> which was furnished with a plan of the pits and galleries explored in 1876 and 1877. This 'Cave-pit' had been gradually filled in by natural agencies, the walls bearing marks of weathering.<sup>3</sup> Blocks were not (as in other pits) thrown in purposely, at least not till after the formation of the red seam which crossed the pit from east to west. Inside one of the galleries was found a block of chalk scored with deep parallel lines and 'bearing some remote resemblance to a rude human figure'. A horn pick, the second of its kind recovered during the exploration, was found in another gallery; and a fine hammer of deer's antler came from the filling of one of the shafts. Three blade-bones of small ox or deer were collected in the main gallery and one of its

<sup>1</sup> These are illustrated on his plate (xxv) and p. 440, this last being accepted as genuine by Pitt-Rivers.

<sup>2</sup> *Journ. Anthropol. Inst.*, vii. 412.

<sup>3</sup> Gen. Pitt-Rivers took a contrary view and saw no traces of habitation in the pits or galleries (*op. cit.*, p. 428).

branches, whilst nothing but two small bones of sheep or goat was noticed in any of the other galleries.

Another shaft was opened in September, 1877, which eventually yielded the second human skeleton (April, 1878). In it was found 'the usual red seam, due to the silting in of the clay which covers the chalk formation at Cissbury to a depth of 7 or 8 inches'. At 8 ft. from the surface it divided into two branches, one extending nearly across the pit and the other continuing at a sharp angle towards the bottom. Rudely made implements with a blade-bone of deer or small ox were noticed between 8-10 ft.; and a pile of flint chippings and flakes occurred in the red seam. Charcoal appeared in the centre at 15 ft. from the surface; and a fine wedge, a pick, and three tines of deer-horn came from the lowest level, apparently in the galleries. At 7 ft. above the floor (20 ft. from the surface) occurred red-deer antlers, and 3 ft. below them remains of the goat. At 16 ft. was part of the lower jaw of *Bos longifrons*; and perhaps at 11 ft. part of the femur of a domestic pig. Flint implements occurred throughout the filling.

Prof. Rolleston also reported on the second skeleton, which was recovered almost perfect and proved to be that of a male between twenty-five and thirty years of age who had been formally buried 16 ft. from the top of the pit and 14 ft. from the bottom.<sup>1</sup> The section was approximately as follows:

|        |   |   |
|--------|---|---|
|        | { | Surface.  |
|        | { | Chalk blocks, about 2 ft.   |
| 16 ft. | { | Red seam, horizontal.   |
|        | { | Filling of chalk rubble.  |
|        | { | Red seam, rising from centre and joining the upper red seam at circumference.   |
|        | { | Chalk rubble, 2 ft. thick.  |
|        | { | Skeleton, laid on red seam.   |
| 14 ft. | { | At 20 ft. several pieces of antler scorched and smoked, with burnt chalk, on north side; on south side, about 5 ft. above the floor, four masses of iron pyrites, one flint implement (point missing); and hard by, 300-400 flakes. |
|        | { | Filling of chalk blocks, more or less cemented.   |
|        | { | Floor of the shaft.   |

The body had been laid on its right side facing the east, in a contracted position with the knees about 6 in. from the chin, the lower legs bent back on the upper, and the fore-arms at right angles to the axis of the body. In front of the knees (or, as Mr. Harrison states, near and in front of the head) was a large flint hand-axe of oval contour, marked C on the photograph of the burial. Eight snail-shells (*Helix nemoralis*) and a burnt pebble had also been placed

<sup>1</sup> *Journ. Anthropol. Inst.*, viii. 377; vii. 431.

with the body, and chalk blocks and unworked flints had been arranged round it to form a sort of tomb. About 2 ft. of rubble, containing six implements 4-5 in. long near its left shoulder, had been heaped over the interment. From the top of this rubble started the middle red seam found in this shaft.

'This seam was to the eye just like the red layer found capping the natural surface of the Downs; and the two deposits might therefore, with considerable probability, be considered to have been formed in the same way.'

Examination of the skeleton showed that the subject had suffered from hemiplegia (infantile paralysis), and the climbing muscles were well developed, perhaps by going up and down the shafts. The stature computed from the femur was 4 ft. 9 in., but measured by the bones when properly arranged half an inch short of 5 ft. The cephalic index was 71 (very dolichocephalic), and the cranium and lower jaw especially contrasted with those of the female skeleton. Full details are furnished by Prof. Rolleston.

The mass of material from Cissbury in public and private collections<sup>1</sup> can merely be dealt with in outline; and, in a paper not entirely devoted to the flints, only some of the leading types can be illustrated. These are naturally such as show most secondary chipping and careful finish, but there is a large and growing series of roughly dressed stones which readily fall into groups and have an interest of their own: for instance, the thick flint of circular or oval outline, with two flat faces (the upper generally retaining the crust), steeply bevelled all round the edge. This type is well illustrated in the British Museum by specimens from the Aurignac cave itself; Les Eyzies, Dordogne; Vellèches and Navclière (Coussay-les-Bois), Vienne; and Dr. Sturge has one from the pit workshop at Cissbury. When not otherwise stated, specimens in the following list are in the British Museum.

- Fig. 18. A long plane with rough fluting at the end and the sides trimmed for handling. Longer than Aurignac planes from French caves, it still has much in common with the earliest finds at Les Eyzies (British Museum).
- Fig. 19. A prismatic tool, carved and pointed. The section is triangular, and the type has been found repeatedly in England. Good evidence of date is afforded by its occurrence in the earliest stratum of Les Eyzies.
- Fig. 20. Two end-scrapers or planes, being clear examples of Aurignac side-trimming. This is a leading characteristic of the period, and can be easily recognized on scrapers and other tools made from blades. The larger specimen has been worn smooth by use at the broader end (Brighton Museum).

<sup>1</sup> Dr. Sturge has a large series as well as the remainder of Canon Greenwell's collection from Grime's Graves; and Mr. Garraway Rice, F.S.A., Mr. Thos. H. Powell, and other gentlemen kindly exhibited selections from their cabinets in illustration of the paper.





Fig. 18. Flint plane, with side view; Cissbury.  $\frac{1}{2}$ .



Fig. 19. Prism tool, side and top views; Cissbury.  $\frac{1}{2}$ .

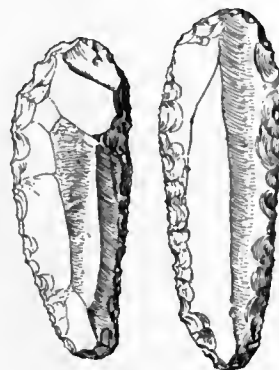


Fig. 20. Two blades with trimmed edges; Cissbury.  $\frac{1}{2}$ .



Fig. 21. Tool like end of celt; Cissbury.  $\frac{1}{2}$ .



Fig. 22. Chisel, with section; Cissbury.  $\frac{1}{2}$ .



Fig. 23. End-scraper; Cissbury.  $\frac{1}{2}$ .

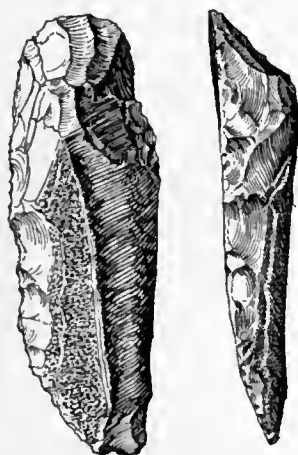


Fig. 24. Fluted plane, with side view; Cissbury.  $\frac{1}{2}$ .

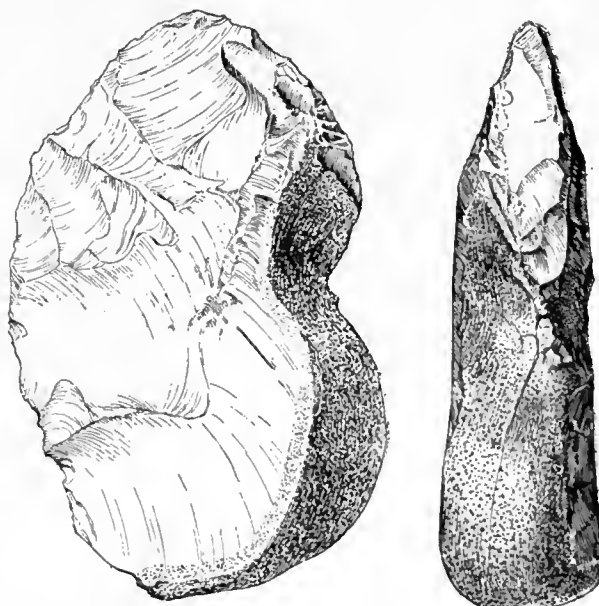


Fig. 25. Flint chopper, with side view; Cissbury.  $\frac{1}{2}$ .

- Fig. 21. A well-made tool resembling the end of a large celt, but probably complete in itself and not accidentally broken across. The fracture may be due to an attempt to obtain the rounded angle known as hinge-fracture, so that it might be used as a chopper without injuring the hand. For a smaller specimen see fig. 5. Most of this pattern are carefully flaked on both faces, and have a flattish base in the form of a long-pointed oval.
- Fig. 22. A carefully made tool, fractured (intentionally?) at the butt and flaked all over both faces. The sides are parallel and sharp like the rounded end. It has been called a chisel, but was evidently not meant for heavy work. An interesting parallel was found in a stratified deposit at Ipswich by Miss Nina Layard (p. 133), the work being coarser and probably earlier.

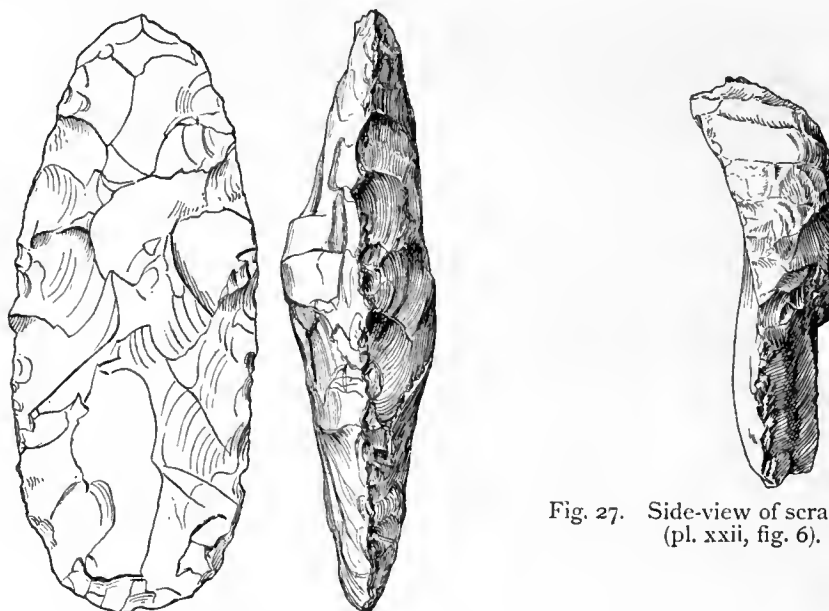
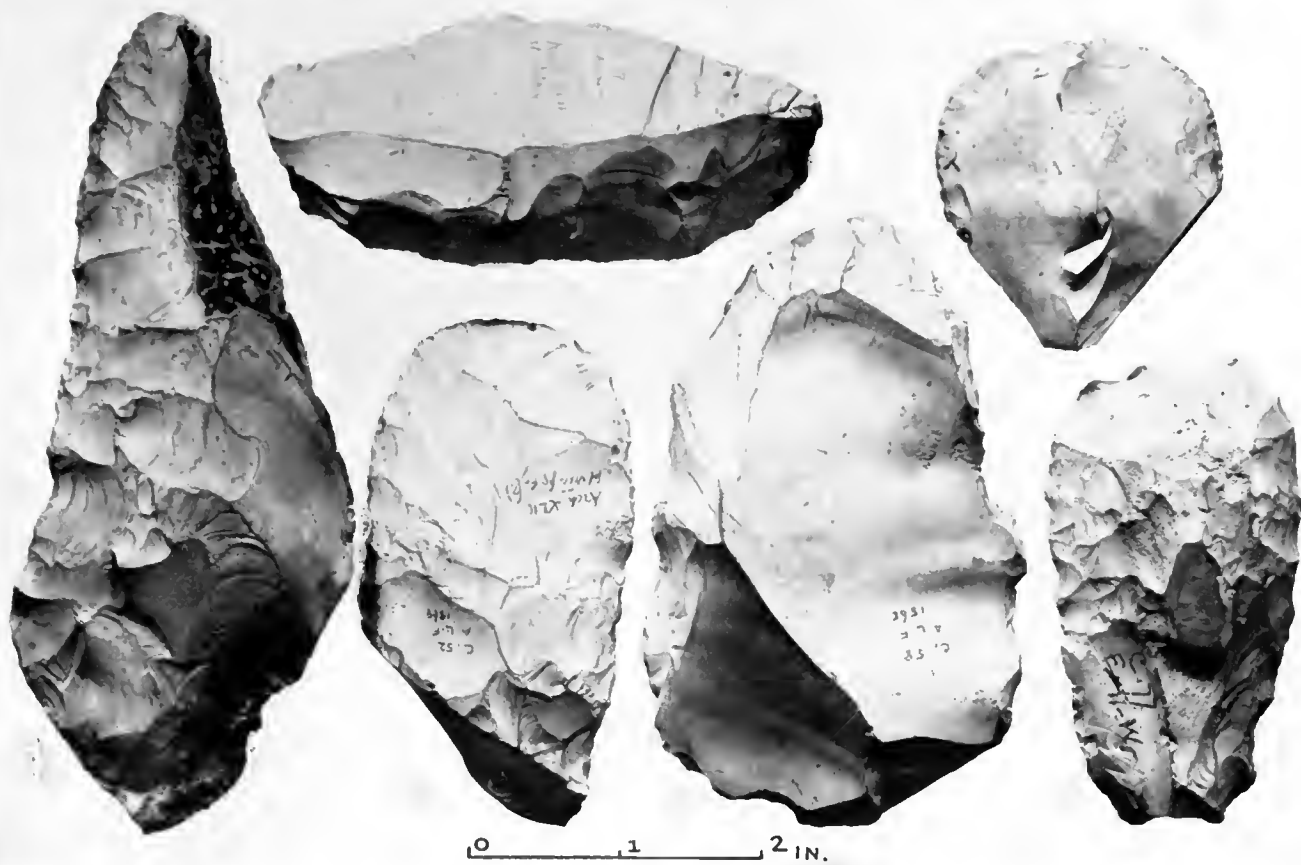


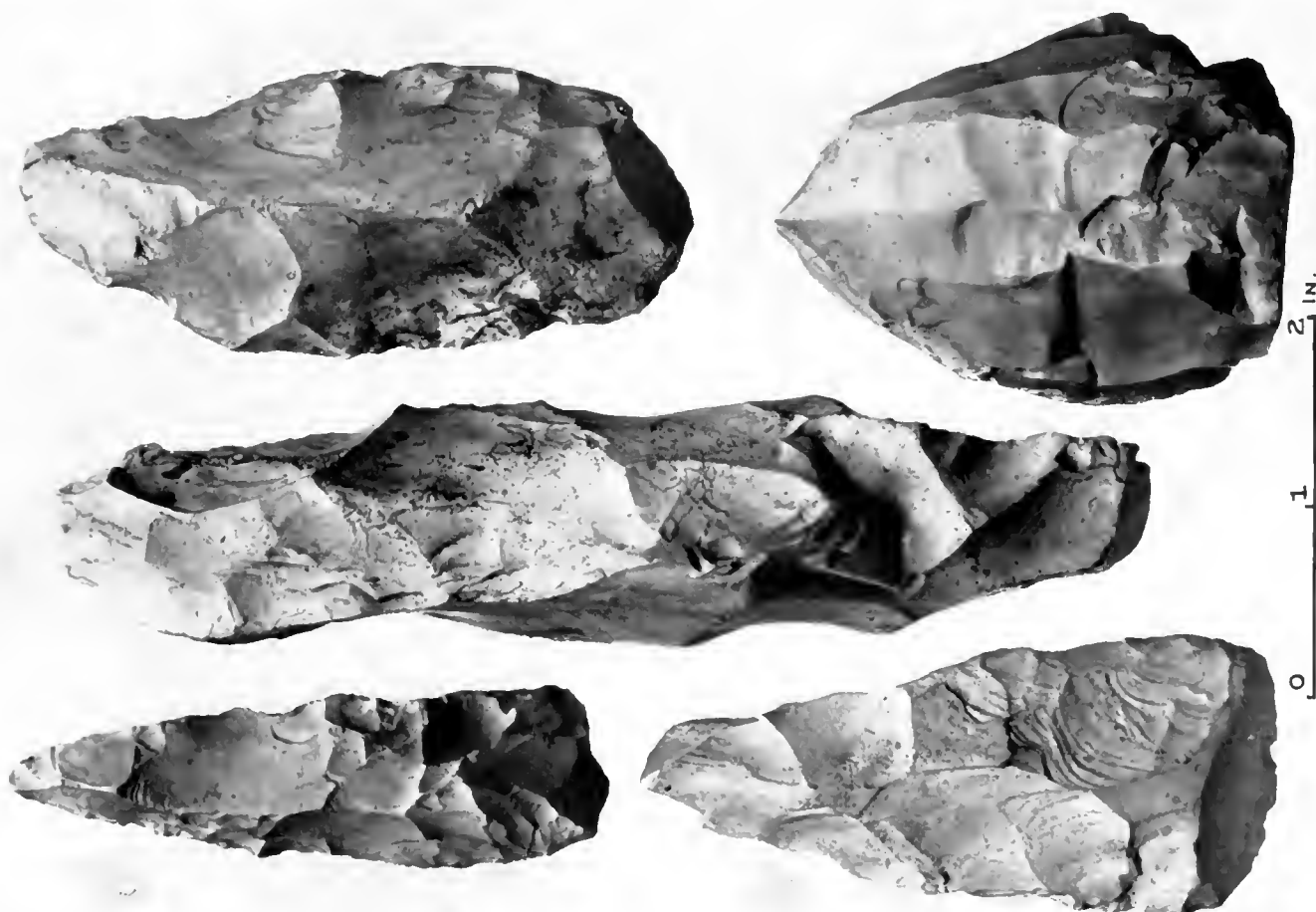
Fig. 27. Side-view of scraper; Cissbury (pl. xxii, fig. 6).  $\frac{3}{8}$ .

Fig. 26. Cissbury celt with lump on one face (front and side).  $\frac{1}{2}$ .

- Fig. 23. Perhaps the commonest form of scraper in the Cave period: a blade with two ridges and rounded end, the butt being left untrimmed (Mr. T. H. Powell).
- Fig. 24. A good example of steep fluting in the Aurignac manner: a plane with the under-face flat, the thick end rounded, and one side trimmed from end to end. This serves as a connecting link between the forms represented in figs. 35 and 18.
- Fig. 25. A chopper with crust reserved on the thick end to prevent injury to the hand in use. Such massive tools are known from Le Moustier, and also from the river-gravels, especially in north-east London. Except for the crust, the surface is quite white; and, though the top is sharp, the principal cutting-edge is along the left-hand side.
- Fig. 26. Here may be mentioned a curious feature that seems to have answered some definite purpose and can hardly be accidental. About the middle of one face of a few Cissbury celts is a large chipped lump. The obvious suggestion that the



Flint implements, Cissbury, Sussex (British Museum)



Flint implements, North of Ireland (British Museum)



implement was never finished is discounted by the repeated occurrence of this protuberance, which is thought by some to imply a certain method of hafting, and to correspond to the stop-ridge of a bronze palstave. An interesting parallel is in the collection of Rev. H. G. O. Kendall, a palaeolithic date being indicated by its provenance. It is a typical Cissbury celt with protuberance on one face, except that it has been stained pale yellow by iron in the gravel of a pit that is well known for its Drift types, surface scratching, and glossy specimens.<sup>1</sup> It should be noted that the Brighton Museum also contains some Cissbury types from Knowle Farm Quarry, Savernake, e.g. the long oval with square ends, the thick sub-triangular hand-axe, and small thick ovate implement.

- Fig. 27. Side-view of the end-scraper shown on plate XXII, fig. 6, with steep fluting at the end and partly along the sides. The under-face has a large bulb and is curved, but quite plain. This is one of the most characteristic forms in the series, and is not known to occur at any other horizon. Like nearly all the Cissbury specimens it is white, and the surface has been extensively scratched or rather torn. This condition need occasion no surprise, as the flint is softened to a measurable depth; but this soft surface is in fact generally intact.

#### PLATE XXII.

- Fig. 1. A large white flake, bluish in places where the black core shows through the white film of patina. Though of unsymmetrical outline, this is a good example of surface flaking, which reached its climax at the Solutré stage.
- Fig. 2. A flake used as a side-scraper (*racloir*), trimming and use having rendered the working-edge steep. The under-face is quite plain.
- Fig. 3. A round-scraper made from a thin flake: the type is rarely found at Cissbury, though larger specimens occur at Grime's Graves. It is also comparatively rare in the Aurignac series, scrapers of this outline being generally thick.
- Fig. 4. A well-flaked example of the so-called 'celt-end', which may be the correct description in this case as the base seems to be due to an accidental fracture. The sides are parallel, and the surface flaked on both faces, which are equally convex.
- Fig. 5. A broad white flake, used as a scraper along one side and at the narrower end: the style is rather that of Le Moustier, but a simple tool of this kind may be found at most periods and is not specially characteristic of any.
- Fig. 6. See above, fig. 27.

#### PLATE XXIII.

- Fig. 1 *a, b*. Two faces of oval tool with surface-fluting at the narrow (working) end, and surface flaking over part of both faces, suggesting the beginnings of Solutré work. From a pit opened by Mr. Willett.
- Fig. 2 *a, b*. A symmetrical 'point' of laurel-leaf form as at Solutré, but the surface flaking only partial and not of the finest quality. Specimens of this form with the same coarse work have been collected at Laugerie Haute, one of the best sites of the Solutré stage.

<sup>1</sup> *Proceedings*, xxiii. 457.

Fig. 3 *a, b*. An irregular flake partially flaked on both faces in a style suggesting rudimentary Solutré work. This and fig. 2 are from pits reopened by Gen. Pitt-Rivers (then Lane-Fox) in 1868.

## PLATE XXIV.

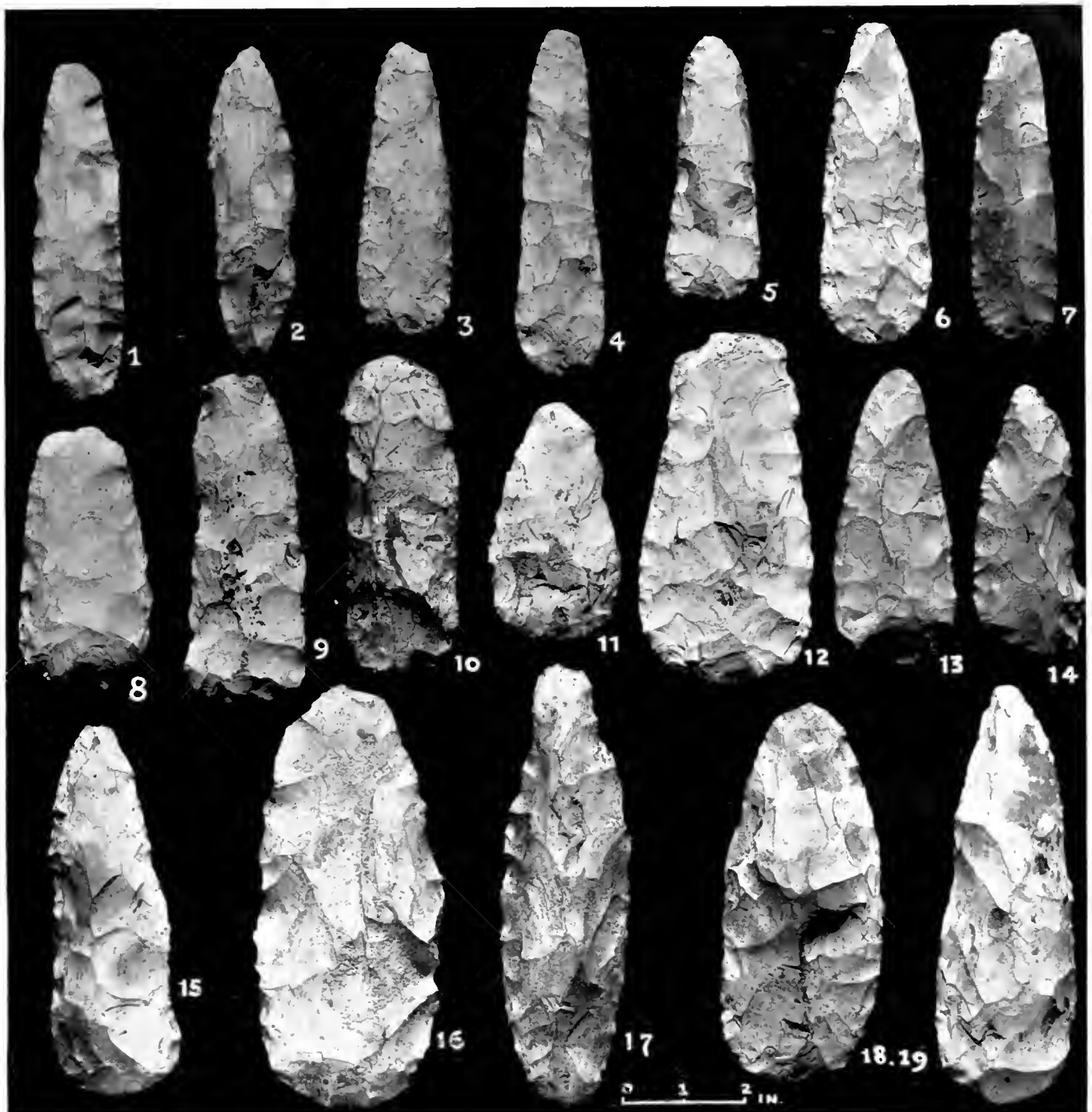
This plate gives all the complete celts in the British Museum from Cissbury, and comprises several varieties of a type generally considered neolithic. They are all flaked on both faces and are more or less sharp all the way round, like many hand-axes of the St. Acheul period, from which these seem to be descended. The type has been found in stratified deposits in this country, but not accepted as palaeolithic merely on account of its close resemblance in outline to the polished celts of neolithic age. An interesting find near Paris is quoted below (p. 133) to illustrate the succession, if not the actual dates, of these 'celt' forms, and the coincidences already noticed apart from this form of implement should justify the inclusion of the celt among the Aurignac types, at any rate in Britain and North France.

Examples of the Cissbury type of celt have long been recognized from other parts of England. Sir John Evans<sup>1</sup> mentioned specimens from Reach Fen (his fig. 23) and Burwell Fen, Cambs.; Thetford, Norfolk; Mildenhall, Suffolk; Witham, Essex; and Farnham, Dorset. Eight were found lying side by side just below the turf on Clayton Hill, Sussex, in 1803, including one 13 in. long; and four were found lying in a row at Teddington, Middlesex. The discoveries at Cissbury are discussed at some length (Evans, p. 78, figs. 26-29), and one of the lesser-known forms described as wedge-like with the thin end rounded, and well adapted for use as a chopper, though the rounded edge is uninjured. To judge from shape alone this and others 'might be regarded as being of palaeolithic age, but their surroundings prove them to be neolithic'. This constant recognition of palaeolithic forms apart from the river-gravels suggests a closer examination of the 'neolithic' surroundings.

An instructive find at Bromehill pit, in Weeting parish itself, is recorded by Evans (fig. 438), and throws some light on the antiquity of the Cissbury type of celt. In the gravel, of which the base was 6-8 ft. above the Little Ouse and the entire height about 24 ft., have been found remains of the mammoth and horse, and at least one narrow celt 5½ in. long with one face much more convex than the other, the broader end being gouge-like. Another, with the same peculiarities but somewhat broader, is lustrous and nearly white (Evans, fig. 420), and comes from Icklingham (Rampart Hill), as does a third (Evans, fig. 422) which is also said to approach the neolithic form, such as his fig. 16, from Newhaven, Sussex. A specimen of the same character (Evans, fig. 440) was probably found at Gravel Hill, Brandon, opposite Weeting; and another, 'of

<sup>1</sup> *Stone Implements*, 2nd ed., pp. 75-6.





FLINT CELTS, CISSBURY, SUSSEX (BRITISH MUSEUM)

Nos. 1-8, 11, 13-15, 17 and 18 were found in the pits; nos. 9, 10, 12, 16 and 19 at various depths in the ditch of the earthwork and in the immediate vicinity.

Nos. 8, 13, 16 and 19 were excavated by the Anthropological Institute committee in 1876, the remainder by Gen. Pitt-Rivers (then Col. Lane-Fox) in 1867-8.



palaeolithic type, which not improbably may have been derived from some gravelly bed,' was found on the surface near Henlow, Beds. (Evans, p. 536).

One of the leading Cissbury types is a segment of a circle, thickest at the base, which is flat and enables the implement to stand up much like a 'tea-cosy', to which another series from Icklingham has been compared by Dr. Sturge. The edge is generally sharp throughout its length, and a frequent feature is a long hinge-fracture on one side of the base, which obviates at least one of the sharp edges that might hurt the hand in use. This mode of fracture was evidently appreciated and seems to have been intentionally produced; but unless Aurignac man had the secret of producing it at will, it is likely that he continued fracturing flints till he got a straight 'hinge', and then chipped a curved edge to suit it. Whatever the process, the type can be traced through several stages of development, from stratified deposits to the age of polished flint.

The relation of this type to the river-gravels has recently been illustrated in an interesting way, in accordance with evidence from elsewhere. In March last Mr. Dewey of H.M. Geological Survey took from the 'bull-head' of the Southfleet pit (or Baker's Hole, Northfleet, Kent), where it lay imbedded 6 in. deep, a flint segment  $4\frac{3}{4}$  in. long with a cutting edge round the curve and a flat base with hinge-fracture along one side (fig. 28). One face has primary flaking all over, the other has a large patch of crust covering the sunk portion that might otherwise be taken for a subsequent break. The dotted line shows the form of a normal base, but this seems to be an early example of the type, to judge from the workmanship; and if the date arrived at on other grounds for this site is correct,<sup>1</sup> this segment should date from the stage of Le Moustier, inasmuch as the deposit was due to extreme cold not long after a mass of Levallois flakes had been worked a few yards off in the same pit. This specimen is a most opportune find, and has been presented by Mr. Dewey to the British Museum.

The next link in the chain is a large example (fig. 29) in the same collection from the cave of Les Eyzies in the Dordogne, where many other parallels have been found; but all these point to an Aurignac date, and it seems clear that Lartet and Christy found a level below that which is generally held to mark

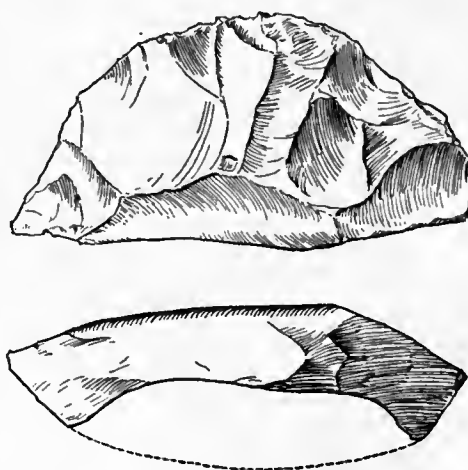


Fig. 28. Segmental tool, with view of base, from coombe-rock, Northfleet, Kent.  $\frac{1}{2}$ .

<sup>1</sup> *Archaeologia*, lxii. 520. Dr. Sturge has a typical Northfleet implement from Weeting, Norfolk, with the large bulb reduced by chipping. A typical flint 'pick',  $4\frac{1}{2}$  in. long, said to have been found below coombe-rock in Selsey, has been published by Mr. Heron-Allen (*Selsey Bill*, p. 72, pl. xii).

the transition from Solutré to La Madeleine. This segment has breccia still attached to it, the flint being somewhat yellow; and is a further indication that Aurignac man was using exactly the same forms of tools in France and England. One in Dr. Sturge's collection is 5 in. high, the base measuring  $5\frac{1}{2}$  in. by  $1\frac{1}{4}$  in. It was found 3-4 ft. deep at Nowton, south of Bury St. Edmunds, and doubtless belongs to the Aurignac stage.

Another, roughly flaked only on one face, has been already described from Grime's Graves (fig. 3), and a smaller one has recently been found in gravel



Fig. 29. Segmental tool, end, side, and base views; Les Eyzies Cave, Dordogne.  $\frac{1}{4}$ .

Fig. 30. Polished segmental tool, with view of base; South Downs, probably East Dean.  $\frac{1}{2}$ .

on the 100 ft. terrace at Greenhithe. One from the surface of the chalk in Dorset is in the British Museum, and the discovery of a certain number with crust over a part or the whole of the base proves that they are not broken tools. The so-called 'ends of celts' seem to be related to these segments, and are likewise complete tools (figs. 5, 21). An interesting question is raised by a polished specimen in Mr. T. H. Powell's collection (fig. 30). The cutting edge is flaked and reduced by grinding to a sharp even line, and the base has the hinge-fracture along one side, the production of which spoils the symmetry of one face. The practice of polishing flint is generally considered purely neolithic, but it is open to question whether the cutting-edge of tools was not produced in this way long before, especially as polished bone-tools date from an early part of the Cave period. The point will be touched upon again (p. 147); and if the present specimen is neolithic, the persistence of the type from Aurignac and probably Le Moustier times is only the more remarkable.

Some interesting discoveries throwing light on the Cissbury problem have

been made by Miss Nina Layard at Ipswich, but not fully published.<sup>1</sup> From drawings and diagrams kindly lent for examination, it is clear that there is a sequence of palaeolithic horizons on this site, and in the upper part of this section, in stratified deposits quite distinct from the soil, were found various forms highly suggestive of Cissbury, particularly a 'chisel' with rounded end and parallel sides much like fig. 22. The peculiar fluting appears on other specimens, and one of the sketches represents the type wrongly described as the broken end of a celt (as figs. 5, 21).

Certain finds in France must here be noticed that have an important bearing on the stratigraphy of the Cissbury type of celt. In 1866 Gabriel de Mortillet figured three typical implements from various strata at Menchecourt, near Abbeville, viz. a lanceolate hand-axe from the lower beds; a long oval implement evidently allied to the Cissbury celt, from the *terre rouge* or loess; and an ordinary polished celt from the rainwash overlying the preceding stratum.<sup>2</sup> Boucher de Perthes had several others from the same neighbourhood, and a still more striking example has recently been found by M. A. Laville,<sup>3</sup> who has kindly permitted its reproduction here (fig. 31). Though not found *in situ*, it evidently came from a coarse sand-bed in the Dauphin pit at Ivry, and may be described as a flint celt 7 in. long, with a dirty white patina stained yellow on one face, and on the other greenish yellow, also bluish in places, 'recalling that generally seen on specimens frankly palaeolithic. The form of this axe, with a cutting-edge all round, so closely resembles the neolithic celt that at first sight and apart from its horizon one could believe it to be neolithic, but it is quite palaeolithic.'<sup>4</sup> The stratum is 5-8 ft. thick, and below it is a seam of pebbles, gravel, and sand, with remains of mammoth; above it, compact clay 2 ft. thick, and then grey loam with numerous flint flakes and fossils. Beneath the humus is a layer of clayey loam of a deep greenish yellow. From a study of several other pits in the neighbourhood of Paris M. Laville has been able to distinguish an infra-neolithic horizon,<sup>5</sup> and it is interesting to observe how the above celt was



Fig. 31. Celt, Dauphin pit, Ivry, near Paris.  $\frac{1}{2}$ .

<sup>1</sup> *Journ. Anthropol. Inst.*, N.S., vi. 43.

<sup>2</sup> *Matériaux pour l'histoire de l'Homme*, ii. (1866) 358: the lower beds are 'sable gras, sable aigre et cailloutis'.

<sup>3</sup> *Bull. et Mém. Soc. d'Anthrop. de Paris*, 5th ser. i. (1902) 209, fig. 3.

<sup>4</sup> In support of this may be mentioned a similar celt in Dr. Sturge's collection from the well-known palaeolithic site at Brome hill, Weeting, Norfolk.

<sup>5</sup> *Congrès internat. d'Anth. et d'Arch. préhist.*, Paris (1910), p. 203.

received by experts at the last Paris Congress. Adrien de Mortillet considered it neolithic, Cartailhac bowed to the stratigraphical evidence, and the Abbé Breuil noted sites in N. Aisne where picks and *tranchets* (kitchen-midden type) had been found with no trace of polishing in pleistocene loams. Other stratigraphical evidence with regard to the two last-named types will be referred to below, but an earlier date is claimed for certain finds at Allonne, near Bracheux, Oise.<sup>1</sup> On the north slope of the cliff on the right bank of the Thérain is a thick deposit of pleistocene drift 167 ft. above the sea; and here at 20 ft. from the surface were found a pointed implement 8 in. long (regarded by Dr. Baudon as St. Acheul I) and a long oval implement with cutting-edge all round,  $1\frac{1}{2}$  in. thick at the centre, and 'of rare form but remarkably regular'. This appears from the illustration to be the prototype of the Cissbury celt, and 8 ft. above it, at a depth of 12 ft., was found a pointed type regarded as St. Acheul II, but perhaps connected with the leading type of La Micoque. In any case, the hand-axe was found above the long oval specimen in the same pleistocene deposit.

Other parallels from France may be mentioned which are not dated by stratification, but are even closer to the Cissbury deposits, and show that the culture was not confined to this side of the Channel. MM. Martin and Hue have described a 'factory' situated in a loop of the Marne, commune of Jablines, Seine-et-Marne.<sup>2</sup> The material mostly used was a brown local flint (*silex ménilité*), rarely black, but a few 'of La Madeleine type' were found with a white patina all over, and black flint with deep white patina is frequently found on the surface in the same neighbourhood. The celt-type was a thin oval, ranging from 2 to  $5\frac{1}{2}$  in. in length, with sinuous edges; three specimens were slightly polished near the cutting-edge. The authors and Dr. Baudouin agreed that these were never intended to be polished all over, but were finished tools. Among the illustrations should be noticed a celt of Cissbury type,  $3\frac{3}{8}$  in. long; a pointed oval tool,  $4\frac{1}{4}$  in. long, with flat faces; and a segmental specimen with base reworked,  $3\frac{3}{4}$  in. long, but not so regularly formed as usual. The paper also contains some interesting reflections on the neolithic period, which is said to be one of the least known and most obscure. The problem is complicated by the abundance of Campigny finds north of the Loire and their absence in the south, where cave-deposits might have determined their true horizon. No connexion can be detected with the Tardenois culture, and whereas Jablines yielded no kitchen-midden celts or transverse arrow-heads, there was an implement of much the same character as the Campigny pick. But there seems little or no reason for placing Jablines a little after Campigny, as the authors are tempted to do.

<sup>1</sup> *Congrès préh. de France*, Autun (1907), p. 94, esp. fig. 10.

<sup>2</sup> *Ibid.*, Beauvais (1909), p. 254, plates i-vi; partial polishing is mentioned, p. 264.



Another 'factory' has been discovered at La Longère, Eure-et-Loir,<sup>1</sup> and among the finds illustrated may be noticed three that agree well with the Cissbury culture, viz. a long celt very much patinated, 7 in. long; a plane, 3½ in. long; and what may be a lamp. The palaeolithic appearance of the finds was duly noticed, but a neolithic date eventually decided upon; and it was noticed incidentally that the iron-stains were found not only on surface flints that might have been touched by the plough, but also on pieces deeply buried. The cause assigned was the oxidation of pyrites, and the same was noticed by Capt. Wade in excavating a flint-mine near Chichester.<sup>2</sup>

An examination of the types associated with Cissbury and Grime's Graves has revealed various palaeolithic traits; and evidence from France, stratigraphical and otherwise, lends colour to the theory that the horizon is palaeolithic. Acceptance of the theory involves in the first place the recognition of palaeolithic flint-mining, an achievement which, in itself and apart from prejudice, is just as credible in the early as in the later Stone Age. Even if the mines are attributed to Aurignac man, it might be contended that the surface finds of that period cannot have escaped disturbance or even destruction in subsequent ages; yet many surface-finds in the vicinity of the pits both at Cissbury and Grime's Graves are evidently contemporary with those obviously left behind by the miners. Nor should this appear extraordinary, for many collectors have surface specimens of the river-gravel types much older than the Cave period and possibly not *in situ*, but still not damaged to any extent, the patina being generally grey or white with more or less iron-staining. If St. Acheul types can still be detected on the surface both here and abroad, there should be no *a priori* objection to Cave specimens from the surface; and the true horizon of the latter would have been recognized long ago but for two ill-founded generalizations, viz. that surface finds were exclusively neolithic, and palaeolithic flints were normally patinated and stained. The first objection has been overruled by evidence, while the most casual examination of French cave-relics would dispel illusions on the second point; and it may be mentioned incidentally that the earliest cave-relics in France or elsewhere are normally devoid of any patina whatever. The mysterious process known as patination still awaits scientific explanation, but judged from that standpoint alone the Cissbury series might well be attributed to early palaeolithic times. The change in mineral condition at Grime's Graves is not so pronounced, but the Sussex specimens, originally pure black, are reduced to white biscuit, a thin core alone remaining to testify to the original colour and condition. Had these worked flints been subjected to the action of iron in

<sup>1</sup> *Congrès préh. de France*, Vannes (1906), pp. 121, 137; figs. 1, 5, 10.

<sup>2</sup> *Proceedings*, xxiii. 241, 385.

solution they would have assumed the colours, and probably the lustre, of gravel implements; and though patina by itself is a poor criterion of antiquity, it becomes an important factor when uniformly distributed over a large and homogeneous series.

A sceptical position based on such arguments as those just examined might easily be proved untenable, and might also be relinquished without regret in view of more formidable objections that will appear in the following pages. But it will first be advisable to discover how far the Aurignac stage is represented in this country by remains that any one acquainted with the results of continental research would accept without question. If such a culture can be traced in parts of England where caves were available for occupation by man and beast, it will next become imperative to produce signs of contemporary civilization in the chalk area.

A brief description of the Aurignac culture at its best, based on recent excavations in Würtemberg, but entirely agreeing with the French evidence, may be quoted here from Dr. R. R. Schmidt's paper on Sirgenstein.<sup>1</sup>

The fauna of the middle Aurignac period undergoes no important change in composition, but is poorer than early Aurignac by a few species; the list is as follows:

|                        |                               |
|------------------------|-------------------------------|
| Elephas primigenius    | (mammoth, frequent)           |
| Rhinoceros tichorhinus | (woolly rhinoceros, frequent) |
| Cervus elaphus         | (red deer, large)             |
| Rangifer tarandus      | (reindeer, frequent)          |
| Equus caballus         | (horse, frequent)             |
| Ursus spelaeus         | (cave-bear, frequent)         |
| Canis lupus            | (wolf)                        |
| Canis sp.              | (species of dog)              |
| Lepus variabilis       | (hare)                        |
| Aquila sp.             | (species of eagle)            |

The middle Aurignac culture of Sirgenstein (near Schelklingen, Würtemberg) presents a larger number of types and a greater advance on the decadent types of Le Moustier than early Aurignac. The Aurignac style of flaking aims at rounding off all angles and edges. Hence arises a series of symmetrical forms, such as the pointed oval, single and double end-scrapers, oval tools and others formed like the point of a leaf. Aurignac work is easily recognized by its deep fluting, which at times covers the entire edge of prismatic blades in a single row, but more often is in more than one row (the so-called step-flaking), covering half the surface of the implement. The butt-end of blades is often rounded off by fan-shaped flaking, or, in the case of thicker prismatic blades, blunted into the form of a wedge by the removal of long narrow flakes. On scraping and cutting tools often occur hollows and notches. To complete the resemblance to the middle Aurignac stage of Western Europe,

<sup>1</sup> Translated from *Der Sirgenstein und die diluvialen Kulturstätten Württembergs* (Stuttgart, 1910), p. 17.

there is above all a series of pyramidal scrapers like those of Spy, Tarté, Brassempouy, Cro-Magnon, La Ferrassie, Pont-Neuf, Bouitou, Les Cottés, Trilobite in the West, and Krems, Willendorf, &c., in the East of Europe. Larger and smaller specimens (of the Tarté plane) occurred at the upper limit of this stratum. Graving-points are still rare, occurring on thick leaf-shaped flakes or on the edge of blades and blade-scrapers; but the bow-graver is not found in the middle Aurignac bed at Sirgenstein. The less typical domestic utensils include blades with the plain face scaled (*mit Aussplitterungen*); the so-called stone-chisels, borers, &c., which also occur in the other Aurignac strata. Compared with the developed stone industry, bone tools are far behindhand; foremost among them are smoothers made of the ribs of large animals (bear, horse, &c.), pointed ivory splinters, lance-heads and awls of bone and horn, blocks of mammoth tusk with supposed hunting-tallies, &c. From the same layer come points agreeing in outline with the Aurignac point, but without the split base. All the bone tools are better smoothed than the lower Aurignac specimens.

In the caves of Britain there are a few unmistakable traces of the Aurignac culture, though the associated fauna cannot now be isolated with any degree of certainty. It is curious and at the same time encouraging to notice the identity of types on both sides of the Channel, and their exclusive connexion with certain horizons, which are best determined in the large series of French caves excavated in recent years under the superintendence of leading experts. Sir John Evans drew attention to one Aurignac feature in specimens from Kent's Cavern (his fig. 392) and Brixham Cave, viz. the trimming of the side-edges of flakes; but the Hyæna Den at Wookey Hole, near Wells, Somerset, was explored between 1859 and 1863 by Prof. Boyd Dawkins and others, and yielded, among other remains in the Cave-earth, a flint flake ( $2\frac{3}{4}$  in. long without its point) which had been trimmed by secondary chipping on the flat face, slightly so along one side, and over half the other face, both edges showing considerable signs of wear by use. Another form, of which two specimens were found of Upper Greensand chert, 'was roughly pyramidal, with a smooth and flat base and a cutting edge all round, much like an instrument found in the cave of Aurignac by M. Lartet.'<sup>1</sup> The partial surface-flaking is clearly an anticipation of the Solutré style; and the greensand cones of Aurignac type prompt one to suggest that 'two rudely fashioned bone arrow-heads of the shape of an equilateral triangle with the angles bevelled off' were none other than the Aurignac bone point with split base; but they have both been lost.

The art of flaking a surface flat seems to have been practised with success at a still earlier date, though not continuously through Aurignac times. Much has been written in recent years on the discoveries at La Micoque, a high bank

<sup>1</sup> Evans, *op. cit.*, 2nd ed., pp. 518-19; p. 498, fig. 391. The cones were found with remains of the hyæna (*Quart. Journ. Geol. Soc.*, xix. 273), and are compared with hundreds found at Standlake and Yarnton, Oxon.

of a tributary stream of the Vézère opposite the well-known site of Laugerie Haute, Tayac, Dordogne, but opinions are still divided as to its true horizon, and few will contend that its problems have been completely solved. Most authorities<sup>1</sup> regard its peculiar industry as a transition stage between St. Acheul and Le Moustier; others, including actual excavators of the site, insist on its



Fig. 32. White flint implement, with side view; Dunbridge, Hants.  $\frac{1}{2}$ .

being a late phase of Le Moustier. The question is complicated by the paucity of the fauna; bones and teeth of the horse were plentiful in this tufaceous deposit, but the remainder consisted of some bones of *Bos primigenius* and *Bison priscus*, and a bear's tooth, though the latest excavator also mentions mammoth.<sup>2</sup> Steppe conditions seem to have prevailed when this open-air settlement existed, and the flint products are peculiar. The surface is white or reddish yellow, and resembles biscuit or porcelain according as the patina is more or less advanced.<sup>3</sup> In the former case it is generally friable and can be easily scratched with a knife, but the work is clearly visible. The white surface is sometimes stained in places by oxide of iron, but never shows signs of rolling; and the origin of the deposit is not explained.

Its mention here is due to the similarity between one of its chief types and a few specimens found in England that apparently help to bridge the gap between the river-gravel deposits and the Cissbury series. The hand-axes of La Micoque are furnished with long slender points and straight converging edges, some specimens having two convex chipped faces, others only one, the other being quite flat.<sup>4</sup> A close parallel to the latter type in form if not in colour has been found at Swanscombe, Kent; but the most striking examples, with the under-surface chipped flat, agree in colour and are of exquisite workmanship. A specimen,  $8\frac{1}{2}$  in. by  $3\frac{1}{2}$  in., in Mr. W. G. Wilsher's collection was found 8 ft. deep in gravel on the Chiltern Hills at Goring Heath, about 450 ft. o. d. Its surface is lusted and bluish white or grey, whereas a beautiful specimen in Mr. Dale's possession (fig. 32) is a lustrous white, the under surface chipped flat and the outline highly suggestive of one of the best specimens<sup>5</sup> from the cave of

<sup>1</sup> References are given by Déchelette, *Manuel d'Archéologie*, i. 86.

<sup>2</sup> O. Hauser, *Bericht über die Prähistoriker-Versammlung in Köln*, 1907, p. 91; see also *L'Homme préhistorique*, 1908, p. 41.

<sup>3</sup> The chemical question is discussed by Dr. Capitan, *Revue d'Éc. d'Anth.*, 1896, p. 411; and Herr Hauser has published a comparative analysis of the patina and core of the flint (*Bericht*, &c., 98).

<sup>4</sup> For another site see *Congrès préh. de France*, Périgueux, p. 176.

<sup>5</sup> A thin assegai-blade, 5.3 in. long, *L'Anthropologie*, 1838, pp. 532, 540, fig. 1; reproduced in

Brassempouy, Landes, of the Aurignac period. Reference to plate XXIV will also show a connexion with the doubly convex celts of Cissbury; and its discovery in the Dunbridge pit (probably in the brickearth), which has yielded a large number of the ordinary Drift types,<sup>1</sup> is an important argument for continuity.

More evidence as to the date of this surface-flaking is afforded by the discovery in Kent's Cavern of finely pointed lanceolate blades, of which one is figured by Evans (his fig. 390). This is of leaf form,  $4\frac{1}{2}$  in. long and nearly  $1\frac{1}{4}$  in. wide, of triangular section, the flat face being only partially worked. The flint is white and porcellanous, and so decayed that it can be cut with a knife, though the flaking is clear. It was found under stalagmite nearly 1 ft. thick, with teeth of hyaena, bear, and fox. Other examples of this partial surface-flaking have been found at Ffynnon Beuno Cave, St. Asaph; and at Creswell Crags, Derbyshire.

Apart from cave-deposits and the classic sites of Cissbury and Grime's Graves, remains of Aurignac man seem to be abundant in South England and may also be detected on the Yorkshire wolds. A large proportion of the North and South Downs series appear to be of this date, and in North Wiltshire one hill is covered with pure-white specimens that are mostly small, but comprise most of the leading types, such as cones, steep end-scrapers, small choppers, and carinated planes. In the neighbourhood of Blandford, Dorset, many specimens have been collected that probably belong to a later stage of the Cave period, but a few of the Aurignac types have also been noticed; and even in Cornwall, where flints straight from the chalk could not be obtained, there are typical Aurignac specimens.

On the Chilterns this stage is also represented, though by somewhat rude examples, on a site that may prove to be another Cissbury; and at High Wycombe on the Great Western and Great Central railway-line a flint-mine with picks and pick-marks was discovered a few years ago.<sup>3</sup>

A section of Thames deposits at the new Admiralty Offices, Whitehall, London, yielded to Mr. Lewis Abbott, besides an interesting fauna, a lanceolate flint and a deeply patinated leaf-shaped implement, both suggestive of reputed neolithic types, though the work was pronounced palaeolithic.<sup>4</sup>

Piette's *L'art pendant l'âge du Renne*, p. 46. Larger examples like Mr. Wilsher's have been found with other suggestive forms in Tunis; see de Morgan, Capitan and Boudy, 'Les stations préh. du Sud Tunisien' (*Rev. d'Éc. d'Anth. Paris*, 1910, pp. 128, 129).

<sup>1</sup> *Proceedings*, vol. xxiv.

<sup>2</sup> *Stone Age Guide* (Brit. Mus.), 2nd ed., p. 72.

<sup>3</sup> *Museums Journal*, 1902, p. 156.

<sup>4</sup> *Proc. Geol. Assoc.*, xii (1892), pp. 349, 354.

An account by Dr. Plowright of a pit or flint-mine on Massingham Heath, Norfolk, is not easily accessible;<sup>1</sup> and the original blocks which might have been introduced here have been lost. The site is 19 miles due north of Grime's Graves, and was described in 1891. The pit was originally 5 to 6 ft. deep and was filled with masses of flint and chalk rubble, large lumps of flint lying on the bottom, and a layer of flakes about 1 ft. thick being just below the turf. The flints were creamy-white to pale blue, often mottled with yellow and brown, and sometimes covered with minute black specks. Instead of being lustred, many were porous and resembled unglazed porcelain, the edges being quite sharp; and the author insisted that the implements were never meant to be polished by grinding. The following illustrations may be referred to as analogous to Cissbury finds: 1 and 2, celts 6 in. and  $5\frac{1}{2}$  in. long; 3, somewhat of kitchen-midden character (*tranchet*); 5, pick 7 in. long, one face being a plain fracture; 6, a tool 7 in. long with similar flat face and pear-shaped outline, with long parallel flaking at end; 7, tool measuring  $6\frac{1}{2}$  in. with oval outline and steep edge-chipping; 10, one of several with the cutting-edge of U outline, generally regarded as the ends of celts,  $7\frac{1}{2}$  in. long,  $5\frac{1}{2}$  in. wide, and 3 in. thick at the butt, the weight being 4 to 5 lb. One pick curved lengthwise, 8 or 10 in. long, weighed 3 or 4 lb., and there were several choppers, consisting of lumps roughly trimmed and provided with a rude cutting-edge. Hammer-stones made of quartzite pebbles were noticed as at Grime's Graves, and deer-antler picks were buried in the rubble. As at Cissbury, circular scrapers were extremely rare.

Attention has recently been called by Mr. W. G. Clarke<sup>2</sup> to similar remains in the vicinity of Norwich, at Easton, Ringland, and Markshall; and it is more than probable that this list will be rapidly increased by local research.

The Yorkshire wolds are only less prolific than the Downs, and there are not wanting indications of Aurignac culture in this northern area. It is clear from the caves of Western Yorkshire that palaeolithic Cave-man defied the elements in that region, and still further north the painted pebbles from Caithness and perforated harpoon-heads from the Oban caves<sup>3</sup> show that human occupation was not rendered impossible by an arctic climate. These belong to the stage immediately succeeding that of La Madeleine and therefore not strictly palaeolithic; but a still earlier occupation of certain Scottish areas is by no means out of the question.

<sup>1</sup> *Trans. Norfolk and Norwich Naturalists' Soc.*, v (1894), p. 250.

<sup>2</sup> A summary of the paper read to the Prehistoric Society of East Anglia, Jan. 22, 1912, is given in the *Antiquary*, March, 1912, p. 116.

<sup>3</sup> These well-known relics have not been frankly accepted by all authorities as contemporary with precisely similar finds abroad (as at Mas d'Azil), but opinion is tending in their favour. See, for example, *L'Anthropologie*, 1896, p. 319; *Congrès internat.*, Paris (1900), pp. 207, 216.



Nor should it be surprising to find traces of the Cave-period in Ireland. Mr. W. J. Knowles has for a long time insisted on the palaeolithic aspect of many finds in the north,<sup>1</sup> and one of his papers describes a site that may be taken as typical. At Cushendall, on the coast of Co. Antrim, have been found many basalt implements that recall the culture of Cissbury or at least of Campigny, and their early date is attested by their geological position. According to Mr. Knowles:<sup>2</sup>

The axes are found below the peat associated with the clay on which it rests. There are various sections in the neighbourhood of Ballyemon which show the connexion of the peat with the boulder-clay. In every case the peat is resting directly on the clay. . . . A considerable thickness of peat has formed in course of time, which is locally known as hard peat, and on the top of the hard peat the Scotch fir grew abundantly. - These trees perished in time, and their roots are now covered with a further thick layer of peat. Occasionally, as the farmer cuts the peat for fuel, polished stone axes are found among the roots of the Scotch fir. The axes from Tievebullagh and Ballymena are found below the peat and even mixed with the clay on which it rests.

It is possible to recognize the Cissbury celt in his nos. 6-8; the steep-ended oval tool in no. 10; the pointed tool with triangular section in no. 36; the chisel with circular section in no. 9; the 'hand-axe' of the Drift in no. 1; the side-scraper of Le Moustier in no. 34; the edge-trimming of Aurignac in no. 38; and its peculiar fluting in nos. 2 and 40. The culture of Campigny is reflected in nos. 22 (*tranchet*, or celt with cutting-edge formed by removing a transverse flake) and 3 (a thick celt  $7\frac{1}{4}$  in. long that is verging on the 'pick' form). These forms also occur in flint, and some whitish specimens from North Ireland are here illustrated:

#### PLATE XXII.

- Fig. 7. Implement of irregular oval form, flaked on both faces; point and blunt butt.  
 Fig. 8. A facettied lump, probably a core, but resembling the Aurignac cone.  
 Fig. 9. A typical pick, roughly flaked, approaching the cylindrical form, with chisel-edge at one end.  
 Figs. 10, 11. Somewhat narrow examples of the transverse axe, as found in Danish shell-heaps, the edge obtained by transverse flaking.

Further investigation may reveal other characteristic forms, but meanwhile a reference to the table on p. 149 will suggest that human work resting on a glacial deposit well below a bed of *Pinus sylvestris* corresponds to the latest Yoldia or earliest Ancyclus phase in Southern Scandinavia, when the glacial sea was being transformed into a fresh-water lake by elevation of the land. The polished celts

<sup>1</sup> *Journ. Royal Soc. Antiq. Ireland*, 5th ser., vii. 1.

<sup>2</sup> *Journ. Anthropol. Inst.*, N.S., vi. 366 (eight plates).

in the Pine layer seem to be earlier than the corresponding stage in Norway, the Nöstvet culture being assigned to the period of maximum depression of the land (Littorina stage, *see* p. 149); but a correlation may yet be established. At any rate, the stock objection to palaeolithic man in Ireland no longer holds, as the mammoth has been found there,<sup>1</sup> and where the mammoth could live man could live also.

Though it is easy to exaggerate the importance of coincidences of form, it should be mentioned that the peculiar style of Aurignac is not confined to Europe, but appears in two series from Africa exhibited in the British Museum. Though little is known of the geological date or distribution of the specimens from sand deposits in Somaliland,<sup>2</sup> Mr. Seton-Karr also brought from the neighbourhood of flint-mines in the eastern desert of Egypt planes and leaf-shaped blades of coarse workmanship that bear a strong resemblance (apart from the colour of the flint) to European specimens of Aurignac date. It would be a great advantage to be able to isolate such forms from among the thousands of surface finds in the desert, and interesting to notice whether the patination and kind of flint remained uniform; moreover, the practice of mining for flint only strengthens the connexion with Cissbury and Grime's Graves. In addition, references should be made to the Aurignac forms found in Tunis and to the discussion of their date in papers on the series, which are admirably illustrated.<sup>3</sup>

Little help can be expected from geology in dating surface finds which, being imperishable, have been accumulating during untold ages, but many of the finds recorded above as presumably of Aurignac date are superficially buried in sandy deposits that may possibly be due to similar climatic conditions at a given time. For instance, at Hundsteig, Krems, on the Danube, forty miles above Vienna, no less than nine horizons could be traced in the loess, the latest human work exhibiting a rudimentary Solutré style, and the bulk being clearly referable to the Aurignac stage.<sup>4</sup>

Recent exploration in the Rhine valley has enabled Dr. Bayer, of Vienna, to date the later loess by its archaeological content, and the following scheme was submitted to the Prehistoric Congress at Tübingen last year:<sup>5</sup>

<sup>1</sup> *British Assoc. Reports*, Portsmouth, 1911, p. 578; Ussher, *Proc. R. Irish Acad.*, xxv. B. 1 (Doneraile). The Aurignac culture seems also to be represented at Toome (Lough Neagh) and Larne (*Proc. R. Irish Acad.*, xxv. C. 183, 189, where Messrs. Coffey and Praeger connect Cissbury and certain other types with land-movements).

<sup>2</sup> *Journ. Anthropol. Inst.*, xxv. 271; the plates convey no idea of the series referred to. Evans, *op. cit.*, p. 653.

<sup>3</sup> *Rev. d'Éc. d'Anth. Paris*, 1910, pp. 207, 208; 1911, p. 226. For Italian analogies, see Morelli, *Iconografia della Preistoria Ligustica*, pl. lxxii and pl. lxxiii, figs. 1-6.

<sup>4</sup> Strobl and Obermaier, *Jahrbuch für Altertumskunde*, iii (1909), p. 129.

<sup>5</sup> *Jahrbuch für Altertumskunde*, iv. 169; *Zeitschrift für Ethnologie*, 1912, pp. 1, 180.

## CLASSIFICATION OF PALAEOLITHIC PERIOD, WITH SPECIAL REFERENCE TO GERMANY

| <i>Geology.</i>             | <i>Climate.</i>   | <i>Industry.</i>  |
|-----------------------------|---|---|
| Würm glaciation             | Post-glacial {<br>Daun<br>Gschnitz<br>Bühl<br>Achen oscillation     | La Tourasse stage (Mas d'Azil)<br>La Madeleine (upper rodent-bed<br>at Sirgenstein) |
|                             | Maximum   | Late Solutré stage  |
| Riss-Würm<br>interglacial   | End of deposit }<br>of later Loess }                                | Early Solutré stage   |
|                             | Steppe conditions: deposit of later Loess.<br>Forest conditions     | Aurignac stage  |
| Riss<br>glaciation          | (Decalcification of older Loess)<br>Lower rodent-bed at Sirgenstein | Le Moustier stage   |
|                             | End of deposit }<br>of older Loess }                                |   |
| Mindel-Riss<br>interglacial | Deposit of older Loess  | St. Acheul stage  |
|                             |   | Chelles stage   |

According to this scheme there was a deposition of loess just before the two glaciations known as Riss and Würm, and the Aurignac culture of the later loess was passing into that of Solutré when a wind-borne deposit covered that part of Europe like a mantle. It has been traced over some part of Belgium,<sup>1</sup> and the island of Jersey is covered with a deposit of this name;<sup>2</sup> but in England the subject is highly controversial. Without entering into the nature and origin of loess in this country, it will suffice to point out that at Cissbury no less an authority than Sir Joseph Prestwich remarked on the difference between the red earth in the filling of the shaft and that lining the ditch of the earthwork. The former was nearly unaltered clay, like that overlying the chalk all over the hill, and the latter consisted of clay and chalk mixed together as if by rain.<sup>3</sup> If the red seams were merely silting, it is difficult to explain the absence of chalk grains in it; and the suggestion may be hazarded that this red earth, which may perhaps be correlated with the cave-earth<sup>4</sup> of our palaeolithic caverns, represents the later loess of the Rhine area. In East Anglia it may have taken another form, as this is the driest part of England. Inland blown-sand is common

<sup>1</sup> Rutot, *Les deux grandes provinces quaternaires de la France*, 23 with map (*Bull. Soc. préh. de France*, 1908).

<sup>2</sup> *Archaeologia*, lxii. 471.

<sup>3</sup> *Journ. Anthropol. Inst.*, v. 373-4.

<sup>4</sup> On this see Lapparent, *Traité de Géologie*, iii. 1702, 1707, who preferred Searles Wood's theory of the loess as given in *Geological Magazine*, 1882, pp. 339, 411.

on the eastern edge of the Fens, and the Breckland is the nearest approach to steppe conditions in the country. Possibly the sand at Grime's Graves has drifted in recent times above the prehistoric flint-mines, wholly or in part, but it is hard to believe that the first flint-miners went through 13 ft. of running sand before coming to the chalk. Surely it is much more probable that the surface was clear of sand when the shafts were sunk, otherwise primitive man must be credited with divining powers equal to his reckless energy in mining under sand.

Nor does the loess in East Anglia lack official recognition. The memoir of H.M. Geological Survey<sup>1</sup> states that 'between Icklingham and West Stow, at a brickfield about a mile ESE. of Icklingham All Saints Church, beneath the gravelly soil, dirty loess-like loam is worked to the depth of 15 ft. It dips westward, and in places contains fresh-water shells, many fragmentary. . . . Bones and deer-horn picks have been found, but were buried up by the workmen.' Discoveries of undisturbed 'working-floors', to all appearance of Aurignac date, under one foot or more of sand (at Ipswich by Mr. Reid Moir, and on more than one site near Icklingham by Dr. Allen Sturge), go far to justify the conjecture that this stage of the Cave period was followed also in England by a deposit of loess. Nor are such occurrences confined to East Anglia. On the south side of Dartford Heath, a well-known area in Kent on the south bank of the Thames, a fine grey celt of the Cissbury type, 6.7 in. long, now in Mr. W. M. Newton's collection, was found under 3 ft. of sand that may perhaps be accounted for in the same way.

In spite of disagreement as to its exact position in the series of glaciations, authorities agree that in the Aurignac period steppe conditions prevailed,<sup>2</sup> and the fauna was adapted to those conditions. It is not proposed to treat the palaeolithic fauna in detail, but to give a few salient instances to show that the usual tests are fallacious, and that so-called domestic animals co-existed with species now extinct. It is notoriously difficult to distinguish between bones of the goat and sheep, and anything but easy to decide whether a particular species was wild or domesticated at a given time, as there must have been transitional forms, showing the development of the domestic animals from feral ancestors. The Celtic shorthorn or *Bos longifrons* is generally regarded as a domestic species, distinct from the wild *Bos primigenius* (aurochs, urus) and *Bison priscus*; but the distinction is anything but sharp, as the shorthorn goes back to palaeolithic times, though neolithic man is usually credited with the first domestication of animals. This, however, cannot be regarded as an axiom, for, apart from the supposed bridle on representations of the horse from palaeolithic caves,<sup>3</sup> and even marks of owner-

<sup>1</sup> *Parts of Cambs. and Suffolk* (sheet 51 NE.), p. 79.

<sup>2</sup> This problem is stated by Dr. Laloy in *L'Anthropologie*, xix (1908), p. 614.

<sup>3</sup> Especially St. Michel d'Arudy, Basses-Pyrénées (*L'Anthropologie*, xvii. 28, fig. 1).

ship on cattle,<sup>1</sup> the sheep, goat, pig, and dog have been found in Cave-deposits that can be dated by the human relics with considerable accuracy. Even if the discovery by Dean Buckland<sup>2</sup> of sheep below mammoth in Paviland Cave, Glamorganshire, is explained by disturbance of the strata, there is no gainsaying the occurrence of the dog at Châteaudouble, Var, in Le Moustier times,<sup>3</sup> or at Sirgenstein, with a species of sheep, in Aurignac times. In a layer 12-16 in. thick over the Neanderthal skeleton at La Chapelle aux Saints (Corrèze) the following species occurred: reindeer, one of the large bovidae (perhaps bison), horse, marmot, fox, badger, a species of goat or sheep, pig, rhinoceros, ibex, marmot, and wolf, this stratum being clearly of palaeolithic age.<sup>4</sup> Prof. Boyd Dawkins, who has rejected most of the evidence for such associations as untrustworthy, himself acknowledges finding a skull of the sheep (*Ovis aries*) with an incisor of *Sus scrofa* under 26 ft. of cave-earth at Avetine's Hole, Burrington Coombe, Somerset.<sup>5</sup> Further, pig and sheep or goat were found in the Ightham fissures of the Shode valley, Kent, with mammoth, rhinoceros, reindeer, and other pleistocene species.<sup>6</sup>

Apart from specific instances there are *a priori* arguments of some weight. It is fairly evident that our domestic species must have been developed from the wild stock in one district or another before the neolithic period;<sup>7</sup> and the change cannot have been effected in a few generations. Unless the domestic breeds came into being during the mythical hiatus, the only conclusion is that they existed during what was the late palaeolithic period in Western Europe; and several authorities now hold that their origin is to be looked for not in Asia, the fabled home of the Aryans, but in Europe itself. Prof. Boule, for instance, stated in 1894 that naturalists now recognize the existence of transitional forms linking the palaeolithic and neolithic faunas, the various types merging insensibly into one another.<sup>8</sup> Zaborowski remarks that the horse was the daily food of pleistocene man at Solutr ; the wild sheep existed in Europe (England included) in pleistocene times, and the goat is as old as the sheep; the urus, bison, and *Bos longifrons* date from the same geological period, and the pig could hardly have been driven over the steppes of Russia into Europe.<sup>9</sup> M. Salomon Reinach

<sup>1</sup> Mahoudeau, *Rev. d' c. d'Anth. Paris*, 1909, pp. 282, 286 (bridles). <sup>2</sup> *Reliquiae diluvianae*, p. 87.

<sup>3</sup> *L'Homme pr historique*, 1911, pp. 143, 167.

<sup>4</sup> *L'Anthropologie*, xix (1908), p. 515; cf. Duckworth, *Prehistoric Man*, table opp. p. 84.

<sup>5</sup> *Internat. Preh. Congress* (Norwich, 1868), p. 282.

<sup>6</sup> Lewis Abbott in F. J. Bennett's *Ightham*, 115, 118; *Quart. Journ. Geol. Soc.*, l. 200; lv. 419.

<sup>7</sup> Hoernes, *Der diluviale Mensch in Europa*, p. 88.

<sup>8</sup> *L'Anthropologie*, 1894, p. 463: 'le fameux hiatus n'existe que dans nos connaissances.'

<sup>9</sup> *L'origine des animaux domestiques en Europe et les migrations aryennes* (Assoc. fran aise pour l'avancement des sciences, Grenoble, 1904, pp. 1034-49).

has also summed up in favour of a European origin both for our domesticated animals and cultivated grains;<sup>1</sup> and in Sweden at any rate the pig was developed locally from the native *Sus scrofa*, that animal being connected with *Sus antiquus* and *Sus palustris* of Rütimeyer.<sup>2</sup> If the beneficent Gulf Stream did indeed ameliorate the climate and allow the grass to grow, it may well be that Southdown mutton dates back to the palaeolithic period. Away from caves one would see little of the beasts of prey who haunted them, such as the cave-bear, cave-lion, and hyaena; and the milder climate would account for the absence of the mammoth, woolly rhinoceros, and reindeer, which characterize the Cave period of Southern France. North of the Loire the conditions seem to have been different, and even in the south there are sites without traces of the cold-loving animals. Solutré seems to have had the same climate as the earlier La Micoque,<sup>3</sup> where the mammoth is indeed mentioned,<sup>4</sup> but most of the bones were of the horse, with a few of the ox and a bear's tooth; and M. Arcelin found that the lower and earlier bed at Solutré contained no bones of animals that have since become extinct.<sup>5</sup> Piette, too, in discussing Brassempouy, emphatically protested against the idea that the Reindeer period was all dry and cold, and considered it to have been first mild, then cold and snowy, and finally rainy, the Solutré stage being, if not warm, at least temperate in the south.<sup>6</sup> The reindeer stage of Piette's glyptic period was preceded by the horse stage, and the distribution of the Aurignac culture shows that the horse predominated in those regions near the sea where vegetation was encouraged by a milder climate.

It may be objected that the mammoth fauna *has* been found in English and Welsh caves associated with human handiwork, and that species which are now regarded as domesticated are rare in caves, if they are represented at all. The latter point has already been touched on; and in regard to the former it should be remembered that in the last few years great advances have been made in cave-exploration, and both bones and flints recovered in the last generation might have been still further subdivided according to their horizons, with different results. Much has been made of the relatively few caverns explored in this country, but it cannot be said that our Cave period has been fully elucidated in the light of recent discoveries. Even if the mammoth fauna could be shown to have persisted from Le Moustier to La Madeleine times, the Cissbury problem would still remain,

<sup>1</sup> *L'Anthropologie*, iv. 551; xvi. 187.

<sup>2</sup> *Les Grottes de Grimaldi*, iii—*Géologie et Paléontologie* (M. Boule, 1910), p. 199; *L'Anthropologie*, xix. 302; xx. 583; Rolleston, *On the domestic pig of prehistoric times in Britain* (Trans. Linnean Soc., 1876, 2nd ser., i. Zoology, p. 251).

<sup>3</sup> *L'Anthropologie*, xvi. 26.

<sup>4</sup> *L'Homme préhistorique*, 1908, p. 41.

<sup>5</sup> *L'Anthropologie*, 1898, p. 553.

<sup>6</sup> *Ibid.*, 1893, p. 467.

<sup>7</sup> Déchelette, *Manuel d'Archéologie*, i. 128; *L'Anthropologie*, 1896, p. 2 (note).



for though abundant abroad, Aurignac specimens have rarely been found in British cave-deposits. The limestone caverns are generally far removed from an abundant supply of flint direct from the chalk; and the Cissbury facies seems practically confined to the chalk area.

Our few cave-relics of the period (p. 137) contrast with the larger specimens and bolder work from the Downs also illustrated in Evans (figs. 205, 209, 215, 216, from Berling Gap, near Eastbourne). These were naturally regarded as neolithic, but fig. 215 especially has the Aurignac stamp, and falls into line with the Cissbury series. Once the connexion is established, it should be easy to identify other Aurignac types in our collections of cave-relics.

The next great obstacle to the recognition of Cissbury as a palaeolithic site is the presence of polished specimens; or rather (since the two or three from Cissbury are generally considered later surface finds), the discovery of a polished basalt celt deep in the pit-gallery at Grime's Graves. This has been noticed above (p. 111), but demands closer attention, as it has governed the chronology of both sites for the past forty years. Rumours that the discovery was regarded locally as a joke, implying *mala fides* on the part of the workmen, have not been substantiated in spite of suspicious circumstances; and Dr. Sturge's diligent inquiries in the neighbourhood only confirm Canon Greenwell's declaration of its entire authenticity.<sup>1</sup> The excavator in a recent letter states that he saw, at some distance from the mouth of the principal gallery, marks on the side-walls made by a tool quite different from the deer-horn picks, and came to the conclusion that they were the result of using a stone axe. Further along the gallery the marks were less sharply defined, as if the axe had been blunted; and still further in, the impression was imperfect at one corner, as if a piece had been broken off the stone. Some days later he was called below to see in the consolidated rubble a black object which was removed by picking in his presence. It turned out to be a basalt axe which to-day is damaged at one side of the cutting edge; and as it fitted the tool-marks, the obvious inference was that this tool had been used in cutting the gallery and was discarded when damaged, as were the deer-horn picks.

It would naturally facilitate matters to discard the axe as doubtful; but its interest is considerably increased by recent discoveries in Norway, and its palaeolithic date is likely to be established. A partly polished celt of greenstone, 2½ in. long, is indeed said to have been found in gravel at a pit near Malton, Yorks., and has given rise to some discussion, Sir John Evans rejecting it as palaeolithic on the ground that the gravel was of glacial origin.<sup>2</sup> At any rate it should be borne in

<sup>1</sup> *Man*, 1908, no. 92, where the Canon's account of the find is given in his own words.

<sup>2</sup> Evans, *op. cit.*, p. 135, fig. 81.

mind that polishing is not necessarily a late product of civilization. There was nothing to prevent primitive man shaping stone by this means; and in the Cave period he certainly adopted the process for implements of bone and antler. Possibly examples have been found and rejected on *a priori* grounds or otherwise explained; but one case well illustrates the danger of foregone conclusions. At the meeting of the Association Française at Blois in 1884<sup>1</sup> M. Adrien de Mortillet exhibited a dozen flints of La Madeleine date, including end-scrapers and graving-tools with traces of polishing. One critic insisted that the hiatus was a brutal fact both as regards zoology and industry, and presumably rejected the find; another accepted the situation and remarked, 'Call it what you will, we are in the presence of the beginnings of neolithic polish, on the way leading to the abolition of the hiatus.' The facile explanation that the tools were polished by continual use was reduced to absurdity by the fact that the polish was at the butt-end, not on the working-edge. The incident suggests a cautious attitude with regard to celts of Cissbury type with the cutting-edge polished. Such specimens undoubtedly exist,<sup>2</sup> and the possibility of their palaeolithic date must be considered, though the evidence at present is not convincing.

To postulate complete polishing of the surface in still earlier times would be futile in regard to flint, but the case is altered when the material is stone of another character. This point has been discussed by Dr. Fischer, who very aptly remarks that some kinds of stone, such as flint and obsidian, flake well, and others have to be shaped by grinding, such as granite, diorite, and serpentine.<sup>3</sup> Such materials were adopted in districts where flint did not naturally occur; and implements of fine-grained stones partly polished are at least as old as the earliest kitchen-middens of Denmark, which are generally considered to mark the dawn of neolithic culture. Important finds at Nöstvet, at the inner end of Christiania fjord, illustrate stages in the evolution of the greenstone celt, and the same types have been found on the coast of Bohuslän and S.E. Norway, as well as at Viste near Stavanger, on the west coast.

The earliest form is long and narrow, with triangular section, generally chipped into shape and seldom ground on the faces of the cutting-edge, the length being  $3\frac{1}{2}$ – $4\frac{1}{2}$  in. Later specimens are larger,  $4\frac{1}{4}$ –6 in. long, and are of trapezoidal section, regularly chipped and always ground at the cutting edge. There is also a group with section intermediate between a triangle and trapezium, but the typical Nöstvet implement may best be compared, in everything but material, with the 'picks' of flint common on the lower Thames and the downs of S.E. England. The probable history of this type in England is noticed

<sup>1</sup> *Compte rendu*, part i, p. 212.

<sup>2</sup> Evans, *op. cit.*, p. 93, fig. 37.

<sup>3</sup> *Korrespondenzblatt der deutschen anthrop. Gesellsch.*, 1882, p. 23; cf. *L'Anthropologie*, 1893, p. 550.

below (p. 153), and it is pointed out by Dr. A. W. Brögger, who has made the subject his own,<sup>1</sup> that the Nöstvet site can be approximately dated by its height above sea-level. Both it and the oldest kitchen-middens of Denmark date from the period of maximum depression of the land below the sea, which is called after the predominant fossil-shell—*Littorina* for Sweden and Germany, and *Tapes* for Denmark, West Sweden, and Norway. The following table gives an outline of the post-glacial earth-movements in the neighbourhood of Christiania, which has been extensively studied in recent years,<sup>2</sup> especially by the geologist Dr. W. C. Brögger,<sup>3</sup> whose son has taken up the archaeological side of the inquiry with interesting results.

| SOUTHERN SCANDINAVIAN AREA                        |   |                                  |                                |
|---|---|----------------------------------|--------------------------------|
| <i>Land Movements.</i>                            | <i>Culture.</i>   | <i>Fauna.</i>                    | <i>Flora.</i>                  |
| Land continued to rise till early mediaeval times | { Iron Age<br>Bronze Age<br>Passage-graves<br>(Chambered barrows) | Limnaea                          | { Spruce                       |
| Land sinks considerably, then rises again         | { Kitchen-middens   | Littorina or Tapes, and red-deer | { Oak<br>Hazel                 |
| Land rises, and Baltic becomes a fresh-water lake | { Maglemose (raft-dwellings)<br>Axes of reindeer antler           | Ancylus and elk                  | { Pine<br>Birch                |
| After Baltic glaciation the land sinks            |   | Yoldia                           | { Dryas<br>(mountain<br>avens) |

That man existed in Denmark long before the maximum Tapes-depression has been shown by Dr. A. W. Brögger, who agrees with Dr. Sarauw<sup>4</sup> in placing the Maglemose culture about the middle of the Ancylus period; when the Baltic was a fresh-water lake, and the land, much higher than at present, was covered with pine forest (*Pinus sylvestris* or Scots pine). To a still earlier date may be referred certain axe-heads made of reindeer antler, so that an older stone age in Scandinavia that has long been an hypothesis is now an established fact, though its exact relation to the better-known industries of Western Europe has still to be determined.

<sup>1</sup> *Öxer av Nöstvettypen* (Norges Geologiske Undersøgelse, no. 42, 1905); *Norges Vestlands Stenalder* (Bergens Museums Aarbog, 1907, no. 1, p. 1).

<sup>2</sup> Maps in Lapparent's *Traité de Géologie*, iii. 1712; many memoirs in *Die Veränderungen des Klimas seit dem Maximum der letzten Eiszeit* (Stockholm Geological Congress, 1910).

<sup>3</sup> *Strandliniens Beliggenhed under Stenalderen* (Norges Geologiske Undersøgelse, no. 41).

<sup>4</sup> *Aarbøger for nordisk Oldkyndighed og Historie* (Copenhagen, 1903), 314.

An interesting discovery in this connexion has been recently made near Christiansund, a large series of flints being collected for Trondhjem Museum, on which K. Rygh has published a preliminary report.<sup>1</sup> He regards them as older than anything hitherto found in that part of Norway, where flint is said not to occur naturally. As there are pieces with all the appearance of raw material, he argues that the tools were at any rate not imported ready made, but doubts their Danish provenance, as ancient sites on the Norwegian coast nearer Denmark have yielded no worked flints, and direct transit by sea at that early date seems out of the question. The midden-type of axe called by the

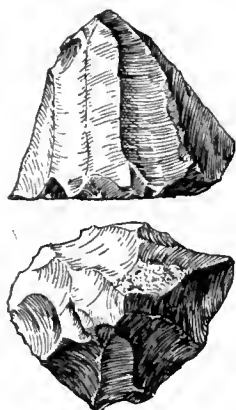


Fig. 33. Flint-cone, side and top views; Seaford, Sussex.  $\frac{1}{2}$ .

French *tranchet* is well represented on these islands near Christiansund, and the conclusion is drawn that the culture is that of the Danish shell-heaps; but some specimens are said to be allied to Maglemose, and at least two of the illustrations suggest the Aurignac period. One is an end-scraper with steep fluting, and the other is a well-shaped flint-cone practically identical with that from Seaford (fig. 33). It is conceivable that this latter type was produced independently at different eras, but in France at any rate it is regarded as the hall-mark of Aurignac culture.

Another determining factor in the chronology of Cissbury has been the discovery in the pits of earthenware sherds. The opinion of Dr. Rutot, based on M. Ed. Dupont's excavations and his own experience, has long been that pottery was known in Belgium as early as the Aurignac stage; and the evidence is vigorously presented in two recent papers,<sup>2</sup> with a number of illustrations. He points out that neolithic pottery is very rare in Belgium (as indeed is the case in England), except at the close of the period, but no less than twelve palaeolithic caves have yielded specimens to M. Dupont, whose skill and accuracy cannot be contested. The site called *Le Caillou qui bique*, near Roisin, Hainault, has proved most productive, the sherds being mixed with flints comprising hand-axes of debased St. Acheul type, Le Moustier points and side-scrapers, all covered with *ergeron* (a variety of loess), and clearly of early Aurignac date. About five hundred fragments were of reddish ware slightly fired, fragile and soluble in water after being immersed a few days. Some were fitted together, but it was not possible to recover the shape of any vessel, and ornamen-

<sup>1</sup> *Oldtiden*, vol. i (Report for 1910), pp. 37, 69. The sites are 100 ft. above present sea-level, the Littorina sea reaching 70 ft. at Christiansund at the time of maximum depression (p. 74).

<sup>2</sup> *Bull. Soc. préh. de France*, 25th Dec., 1907, and 26th Nov., 1908.

tation seems only to have begun with La Madeleine times (Goyet horizon). Among the pieces figured are the well-known vase with pierced lugs from Furfooz (cast in British Museum), a cup with round handle, a fragment with thick moulded lip, and three with parallel incised lines. Further, it was noticed that limestone grit, made from the cavern walls, was mixed with the paste in palaeolithic times, and was only covered with a white film of lime, owing to imperfect firing, whereas silicious grit was largely employed for the same purpose by the neolithic potters.

In France itself pottery has been discovered at Beauregard, near Nemours, Seine et Marne,<sup>1</sup> in surroundings that prove it to belong to the stage of La Madeleine; and it may be conjectured with some confidence that other finds have been made in excavating caves and other palaeolithic sites, but not credited as contemporary, and explained away by subsequent disturbance or accidental introduction by burrowing animals.

Most authorities would agree that the earliest pottery discovered in France is that from the pit-dwellings of Le Campigny, 25 miles due east of Dieppe. The site has given its name to a phase of culture about which the last word has not been spoken. The tendency is to make it the earliest neolithic stage and to correlate it with the Danish kitchen-middens, but nothing like proof of its horizon has yet been brought forward. Dr. Hoernes says, 'the Campigny period has many good points but one serious defect, that it absolutely refuses to fit into Piette's system. It has not the least connexion with the Mas d'Azil culture (transition from palaeolithic to neolithic), and naturally none with the Robenhausen stage (Piette's *pélécyque*, or polished celt stage). There remains nothing but to assume that the transition took one form in the south and another in the rest of France—a dangerous hypothesis, imperilling the view that, in spite of local variations, the Robenhausen culture became in the end universal'.<sup>2</sup> No site has yet been discovered on which the Campigny industry is found stratified between two datable horizons, and it seems probable that it never will be found under such conditions. As it is normally absent in the south of France<sup>3</sup> and extremely frequent north of the Loire, the suggestion may be hazarded that it is contemporary with one or more stages of the Cave period. It is unnecessary to suppose that caves were indispensable for human occupation at that time, or that areas with no natural caves were uninhabited. This point has

<sup>1</sup> *Congrès préh. de France*, Beauvais, p. 235 (H. Martin).

<sup>2</sup> *Der diluviale Mensch in Europa*, p. 89; cf. MM. Martin and Hue, *Congrès préh. de France*, Beauvais (1909), p. 259.

<sup>3</sup> Isolated surface specimens of Aurignac type may be seen in the British Museum from Pontlevoy, Orleans; and others from Poitou are unmistakable but include a typical celt of Cissbury type 4 in. long, patinated creamy white.

been touched on above (p. 136), and a few words may be added on later developments of Cissbury types both here and abroad. Though a connexion with the polished celt is fairly obvious, and archaeologists have long been waiting for light on the genesis of the Cissbury celt, it is none the less important to follow up the subsequent development and trace back to Cissbury various forms that would otherwise be isolated and undatable.

The accompanying illustration (fig. 34) represents a well-made tool of bluish-grey chalcedonic flint in Mr. A. E. Relph's collection. It was found on the surface of a field at Swanscombe with other specimens apparently of the Cave period, and has certain features in common with the tanged scraper from Grime's Graves and the humped scrapers or carinated planes from that site and from Les Eyzies

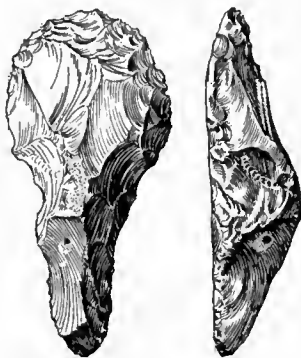


Fig. 34. Tanged scraper, with side view; Swanscombe, Kent.  $\frac{1}{2}$ .

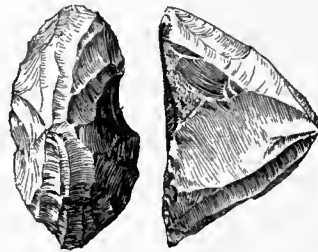


Fig. 35. Double scraper, with side view; Les Eyzies.  $\frac{1}{2}$ .

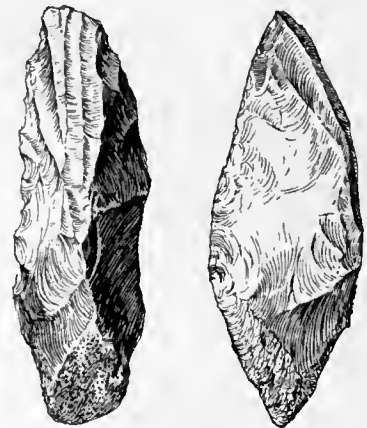


Fig. 36. Fluted plane, with side view; Les Eyzies.  $\frac{1}{2}$ .

(figs. 35, 36). Whatever its exact horizon, it has certainly the appearance of having been subjected to scratching under great pressure. The specially hard surface is not only scratched in lines, but has a row of curved fractures as if bruised by the passage of a hard point, much like the 'chattering scratch' familiar to geologists. Dr. Sturge has suggested that these and other types of marking were due to ice-action,<sup>1</sup> and if the specimen illustrated is really of Aurignac date, the striation can be readily accounted for, as the loess deposit that closed that stage of the Cave period heralded a glaciation of some severity, whether it is to be identified with the Würm or the oscillations that followed it.<sup>2</sup>

A more clumsy tool somewhat on the same lines (fig. 37) is from a factory at Girolles, Ferrières, Loiret, and is one of twenty-one specimens from the site in the British Museum. These include a segmental tool with broad straight

<sup>1</sup> *Proc. Preh. Soc. E. Anglia*, i. 79; *Proceedings*, xxiii. 238.

<sup>2</sup> One scheme is reproduced on p. 143; but it should be mentioned that some authorities place the Würm glaciation before Aurignac, e.g. Obermaier in *L'Anthropologie*, xvi. 26. For the points in dispute, see table in *Zeitschrift für Ethnologie*, 1912, p. 22.



base, several roughly chipped celts, and a representative of the type resembling the broken end of a celt, but in reality a tool complete in itself (as figs. 5, 21). The rest might also belong to the Aurignac stage. A type related to the humped plane has been found more than once in Dorset, with a pronounced 'waist' (fig. 38). Like most from the same area it is deeply patinated and white all over; and a flatter specimen (fig. 39) found near Cissbury (Brighton Museum) is interesting as having been flaked at two periods sufficiently removed from each other to allow of a marked difference in patination. Both ends have been re-sharpened, and the later work is bluish, easily distinguishable from the main

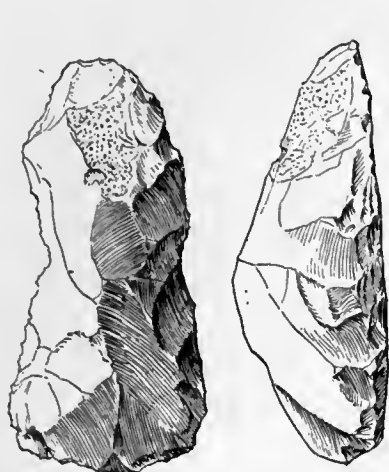


Fig. 37. Implement, with side view; from factory, Girolles, Loiret.  $\frac{1}{2}$ .

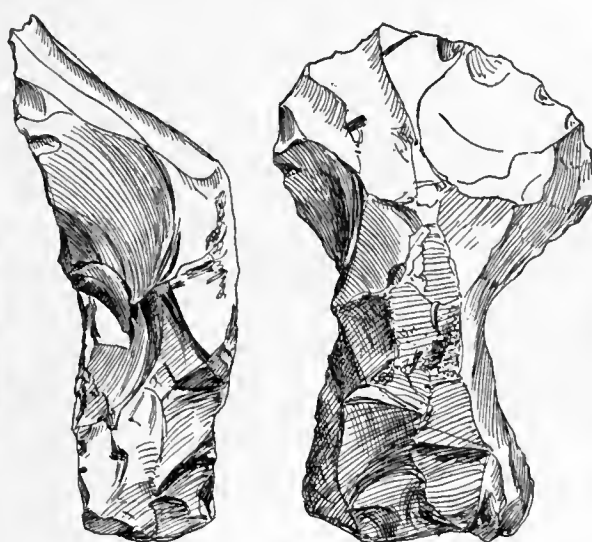


Fig. 38. Waisted plane, side and top views; Dorset.  $\frac{1}{2}$ .

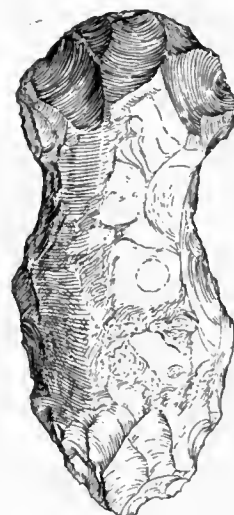


Fig. 39. Plane, reworked at both ends; near Cissbury.  $\frac{1}{2}$ .

white surface. Whether these specimens are consecutive or approximately contemporary is at present uncertain, but a type hitherto isolated can now be placed in a logical, if not also in a chronological, sequence.

Another case of development from a Cissbury or Aurignac type may be more fully treated on another occasion; but any clue to the date and origin of the flint 'pick' so common in the Thames and on the North and South Downs will be welcomed.<sup>1</sup> An exceptional specimen, perhaps the longest known (14 in.), is in Salisbury Museum, and has a whitish surface; but many of the ordinary size (7-8 in.) have little or no patination. Examples of this size do not seem to have been found in or near the Cissbury pits nor at Grime's Graves, and they probably represent a later development, well seen at Campigny, Spiennes, and other well-known sites. The prototype, however, can apparently be recognized in the small

<sup>1</sup> See also *Congrès internat.*, Paris (1900), p. 214.

cylindrical tools with one blunt end found at Cissbury and common on the Downs, generally about 3 in. long. Intermediate length can doubtless be found in many collections, and this may be a case in which patination will be a trustworthy guide to relative date.

The stratigraphy which is supposed to guarantee the current view of the flint series examined above is due in the first place to M. D'Ault du Mesnil,<sup>1</sup> whose researches have established the following sequence:

1. Finer work, chisels (celts), and small forms all derived from the transverse axe (*tranchet*); polished.
2. Clay stratum; side-scrapers, end-scrapers, 'points,' coarse transverse axes, large picks; unpolished.
3. Loess, palaeolithic.
4. St. Acheul horizon.
5. Chelles horizon.

Reference has already been made (p. 133) to the investigations of M. Laville, who has found on several sites round Paris an horizon that he calls *infra-neolithic*, a non-committal term which reflects the prevailing uncertainty as to the origin of neolithic civilization. The sequence may be established, but the delimitation of the two stone ages has yet to be accomplished.

The best description of Le Campigny bristles with illustrations of palaeolithic forms which obviously discount the conclusion arrived at, on the following grounds, that the culture is neolithic. 1. Many hearths prove that the site was selected for habitation. 2. Polished stone was found in the humus, over two other layers (the filling and the hearth), in which no polished stones occurred. 3. Polishing of stone was unknown at the time the hearths were in use. 4. The flint industry retained some forms characteristic of La Madeleine and even Le Moustier, but also comprised new forms such as the pick and transverse axe. 5. Pottery, both rough and finer ware, preceded the polishing of flint. 6. Campigny follows the mesolithic stage (apparently Mas d'Azil). 7. Grinding-stones prove the use of grain and, by inference, agriculture. 8. Fauna and flora same as at the present day.<sup>2</sup>

A full description of such a well-known site would here be out of place, but attention may be drawn to one or two points of interest in the present connexion. Under a few inches of soil with its polished flints was a layer of yellow loam 4 ft. thick, sandy and mixed with natural nodules of flint 'de toute provenance'. As the chalk (below the pleistocene gravel in which the pit was sunk) is devoid of flints (Turonian), these cannot be the mouths of flint-mines,<sup>3</sup> but there is a

<sup>1</sup> *Congrès internat.*, Paris (1900), p. 207.

<sup>2</sup> *Rev. d'Éc. d'Anth. Paris*, 1898, p. 406.

<sup>3</sup> The flint was mined a mile away, on the opposite side of the Bresle valley.

superficial resemblance to Grime's Graves, which have an upper layer of sand mixed with flint nodules (p. 110).

A store of picks and deer-horn tools was discovered, and further, the flints found in and above the hearth level differed from ordinary neolithic implements in their freedom from patina and the freshness of their broken surfaces. The stone was grey but oftener black, with iron and manganese deposits. Bones of the ox, horse, and stag were recognized, but the fauna was badly preserved; and charcoal from the hearths was from the oak and ash. As special emphasis is laid on the absence of any trace of polish below the soil, it is not surprising that the flint-forms merge into the palaeolithic. There are indeed picks, chisels, and transverse axes, but it seems unwise to call these neolithic without qualification, in view of the typical cave-types in undisputed association with them, such as the side-scraper (*racloir*), graving-tool (*burin*), parrot-beak point (*bec de perroquet*), blade with battered back (*à dos abattu*), and core-scraper (*grattoir Tarté*), of which no less than eight specimens were found, and compared with those from Brassempouy. The occurrence of pottery apart from, and obviously earlier than, polished celts was commented on, and no less than 300 sherds were found, some with round handles (as in Belgium), but rarely ornamented with lattice and chequer patterns. One illustrated specimen is not unlike some rough markings on the chalk wall in one of the Cissbury pits.<sup>1</sup>

It is not suggested that the Campigny culture is contemporary with that of Cissbury and Grime's Graves, but rather that it belongs to a somewhat later stage which is revealed in an abundance of finds in the Thames Valley and on the chalk downs of Southern England, as well as in Scandinavia. In the Cissbury series may be found the rudimentary pick, a rough cylinder of flint pointed at the ends or furnished with a narrow chisel edge at one or both extremities. The typical pick does not seem to occur in the English flint-mines, and is only rarely patinated white, the majority being quite unchanged or turned to some shade of grey. This may be regarded as the rule, and another is that the long picks are less patinated than the short specimens, and for this if for no other reason are presumably later.

The discovery at Catenoy, near Clermont, Oise, of a culture similar to that of Campigny, gave rise to some interesting speculations on the part of Dr. Capitan.<sup>2</sup> Below the humus and superficial deposits, 12-16 in. from the surface, occurred palaeolithic cave-types, including gravers (coarser than those of La Madeleine), end-scrapers, also transverse axes (*tranchets*) and picks somewhat finer than at Campigny; bones of the ox, pig, and sheep; pottery fragments

<sup>1</sup> Campigny, fig. 47, and *Journ. Anthropol. Inst.*, vi. 440.

<sup>2</sup> *Congrès internat.*, Paris (1900), p. 211.

both coarse and fine, but no trace of polished flint. This culture was regarded as neolithic, an advance on Campigny and probably a development of it; but the possibility of a local facies is fully recognized, and a transition stage different from Mas d'Azil regarded as possible.

Time alone will show whether this equation is justified, but the idea of local facies is a fruitful one, and may explain much that is still obscure at Cissbury. A contrast has already been noted in development north and south of the Loire; and as the final separation from the Continent is generally assigned to the stage of La Madeleine, there can be little hesitation in grouping the finds of Southern England, especially the chalk area, with those of Northern France and Belgium. Whatever the exact sequence, there is something more than an accidental resem-

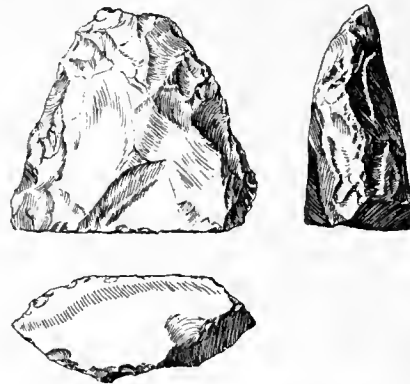


Fig. 40. Segmental tool, with side and base views; C. Arcona, Rügen.  $\frac{1}{2}$ .

blance, for instance, between the products of Cissbury, Campigny, and Spiennes; and continental authorities have already linked the Campigny culture with the kitchen-middens of Denmark. Further, certain surface-finds named after Le Flénu, near Mons, Belgium, seem to belong to the Aurignac culture, though regarded as proving a recrudescence of eolithic barbarism by Dr. Rutot, whose good offices secured for the British Museum an interesting type series. The material used is not of the highest quality, though doubtless the best procurable in the circumstances; and it is interesting to see reproduced some of the forms rendered familiar by Aurignac finds elsewhere, such as the cone and the humped scraper or steep-ended plane, whereas the specimens from Élouges in the same neighbourhood are perhaps more truly allied to Campigny. Nor should it be overlooked that Dr. Rutot<sup>1</sup> has placed the industry of Le Flénu before that of Campigny or Spiennes, on the strength of discoveries at Avennes (Waremmé, Liège), where flint was mined in prehistoric times. This would exactly agree

<sup>1</sup> *Bericht über die Prähistoriker-Versammlung in Köln, 1907*, p. 137; *Le Flénusien aux environs de Liège et en Hesbaye*, p. 3 (C.-R. du Congrès de la Féd. arch. et hist. de Belgique, Liège, 1909).

with the views now put forward with regard to Cissbury and Grime's Graves, and specimens recently acquired for the British Museum from Arcona in the Baltic island of Rügen are of the same character, including a typical segmental tool (fig. 40). These may or may not resemble the Rügen flints compared by Dr. Rutot with the series from Le Flénu, but the concordance is at least instructive. The facies therefore is not altogether local, but rather suggests a fundamental difference between the culture of areas rich in flint and that of Southern France, where the later Cave types were uniformly evolved. As the chalk covers a large part of Northern France as well as South-east England, it is permissible to trace this cultural divergence to climate, fauna, flora, and other local conditions, not necessarily to a difference of race.

Apart from its insular position, England should experience at least the severe winters of Quebec, the latitude of London being the same as the southern shore of Hudson Bay. But the proximity of the Atlantic in itself would mitigate the climate of Western Europe, and the Gulf Stream would have brought not only moisture but warmth to Southern England, at least since the Channel was formed. The effect of this on the flora and fauna of this country must have been considerable, and the series of discoveries made in recent years on the west coast of Norway are easier to understand when it is remembered that the Gulf Stream keeps open the harbours of Norway all the year round as far north as Hammerfest. A specially mild climate would fully explain the absence in the Aurignac period of cold-loving animals such as most of the mammoth fauna, and the absence of caves would inconvenience the larger beasts of prey, such as the cave-lion, cave-bear, and hyaena, while the chalk downs can never have provided enough cover or sustenance for large animals that take naturally to the forest. On the other hand, all the conditions were favourable to herbivores; and on the Downs, if anywhere, the red-deer, ox, goat, sheep, and pig would have found both food and security, each ministering in its own way to the necessities of man.

It will thus be seen that the standing objections to the Cissbury culture being palaeolithic are not insuperable, and were indeed discounted by various authorities years before some of the best evidence was available. The effect of such a theory on the old question of an hiatus has lastly to be considered.

This famous hypothesis is presented in a concise form by Dr. Rice Holmes,<sup>1</sup> who does not spare its principal English supporter. As his pages are crowded with references, it is only necessary here to allude to the published opinions of

<sup>1</sup> *Ancient Britain*, pp. 382-390: to the references there given may be added *Bull. Soc. d'Anthrop.*, 1895, p. 266 (Piette).

Prof. Boule,<sup>1</sup> a leading authority on the natural history side of the question. He holds that the work of Piette in the Pyrenees and Allen Brown<sup>2</sup> in England brought the hiatus-theory into discredit, and himself undertakes to prepare a list of species showing an insensible transition from the palaeolithic to the neolithic fauna. In connexion with the alleged zoological break Dr. Rice Holmes remarks most pertinently that

'the contrast between the palaeolithic and wild neolithic faunas... implies no break at all, seeing that 31 of the 48 older species confessedly lived on :<sup>3</sup> it implies no more than is implied by the disappearance of the urus, the wolf, the wild-boar, and many other animals which were living in this island at a time since which it has been continuously inhabited by man. . . . Arab horses, Siamese cats, and many other animals have been introduced into this country since the Christian era : yet the people who were here before their introduction did not become extinct.'

The difficulty all along has been to prove a connexion between Cissbury types and those of the river-gravels; the derivation of the neolithic celt from the former is obvious, and an unbroken development from the Drift is more than probable. Mr. Allen Brown seems to have been justified in regarding certain surface-finds at East Dean, Sussex, as earlier than neolithic, but the term 'mesolithic' which he applied to them can hardly be recommended. From what has been said above it may be concluded that many surface finds present so close a resemblance to typical French cave-relics as to justify their attribution to late palaeolithic times, and the issue is only obscured by the retention of a name which, if it does not create the gap that it professes to fill, at least exaggerates the length and importance of a transition stage. It may be that archaeologists will revert to the old view that the neolithic period was that during which flint implements were normally polished. In that case Cissbury and Grime's Graves would be excluded; and if analogy or identity of type counts for anything, the only alternative is to adopt the most widely accepted classification, and regard as palaeolithic not only these two leading sites, but many others of the same facies that have been, or will hereafter be, discovered.

<sup>1</sup> *L'Anthropologie*, 1894, p. 463.

<sup>2</sup> *Palaeolithic Man in N.W. Middlesex*; and *Journ. Anthropol. Inst.*, xxii. 66. Mention should also be made of Mr. W. J. Knowles's paper in *Journ. Royal Soc. Antiq. Ireland*, 5th ser., vii. 1.

<sup>3</sup> Of the nineteen, twelve migrated and seven became extinct.









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